GE HealthCare

Technical Publications

Direction DOC2512664
Revision 9

Enterprise Archive 8

DICOM CONFORMANCE STATEMENT

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1 CONFORMANCE STATEMENT OVERVIEW

The Enterprise Archive, or EA, implements the necessary DICOM services to facilitate the archiving and image management role in the healthcare departments. It enables the capabilities to archive instances from any networked DICOM modality, inform other DICOM peers or Information Systems, and route them anywhere they're needed in the medical facility.

All Standard Storage SOP classes listed in Table 4 can be received, stored, and transmitted. Several private storage SOP classes are also supported; these are listed in Table 5.

The table below provides an overview of the additional non-storage SOP classes supported by EA. The Query SOP classes support relational queries.

Table 1 Non-Storage SOP Classes

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Query / Retrieve		
Patient Root Query/Retrieve Model – FIND	Yes	Yes
Patient Root Query/Retrieve Model – MOVE	Yes	Yes
Study Root Query/Retrieve Model – FIND	Yes	Yes
Study Root Query/Retrieve Model – MOVE	Yes	Yes
Workflow Management		
Storage Commitment Push Model	Yes	Yes
Modality Worklist Information Model – FIND	Yes	No
Detached Study Management	Yes	Yes
Modality Performed Procedure Step	Yes	Yes
Instance Availability Notification	Yes	No
Detailed Detached Study Management (private)	Yes	Yes
WADO Network Services		
WADO - URI - Retrieve Imaging Document	No	Yes
WADO - URI - Retrieve Rendered Imaging Document	No	Yes
WADO - WS - Retrieve Imaging Document Set	No	Yes
WADO - RS - Retrieve Imaging Document Set	No	Yes
QIDO – RS - Search Imaging Document Set	No	Yes
STOW – RS – Store Instances	No	Yes

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3 INTRODUCTION

3.1 REVISION HISTORY

Revision	Date	**Description**
1	May 2021	Initial version.
2	July 2021	Added support for Comprehensive SR 3D SOP class
3	August 2021	Added support for Radiopharmaceutical Radiation Dose SR Storage SOP class
4	October 2021	Added new private tag GEIIS Image Order(0903, xx30) Updated IAN with missing information about status Added Character Set Corrections section in Table 103
5	August 2022	• Added new private tags with Private Creator ID (3125, 00xx) = "GEHC-IT/Enterprise Archive/Version 8.0". • Added new Table 122 "Private EA Attributes in the group (3125, 00xx)" • Updated section '4.2.1.8 STOW-RS Specifications' for Additional endpoints support on STOW-RS service with AE_TITLE suffixes for PACS Archive
6	May 2023	Added new private tags with Private Creator ID (3125, 00xx) = "GEHC-IT/Enterprise Archive/Version 8.0" in table 122.
7	September 2023	• Removed content of Revision 5 and 6 as product is not released yet. • Updated the Table 2 Return Statuses for Receive Instances for Reject instance on Patient Identity mismatch. • Updated Table 80 HTTP Standard Response Codes for 202 Status Code.
8	November 2023	• Updated Copyright and GE HealthCare.
9	January 2024	• Updated the content in section 4.2.1.8.1.4 SOP Specific Conformance for SOP Class(Es). • Updated the font inconsistency in Table 48

3.2 AUDIENCE

The reader of this document is concerned with software design and/or system integration issues. It is assumed that the reader of this document is familiar with the DICOM Standard and with the terminology and concepts that are used in that Standard.

3.3 REMARKS

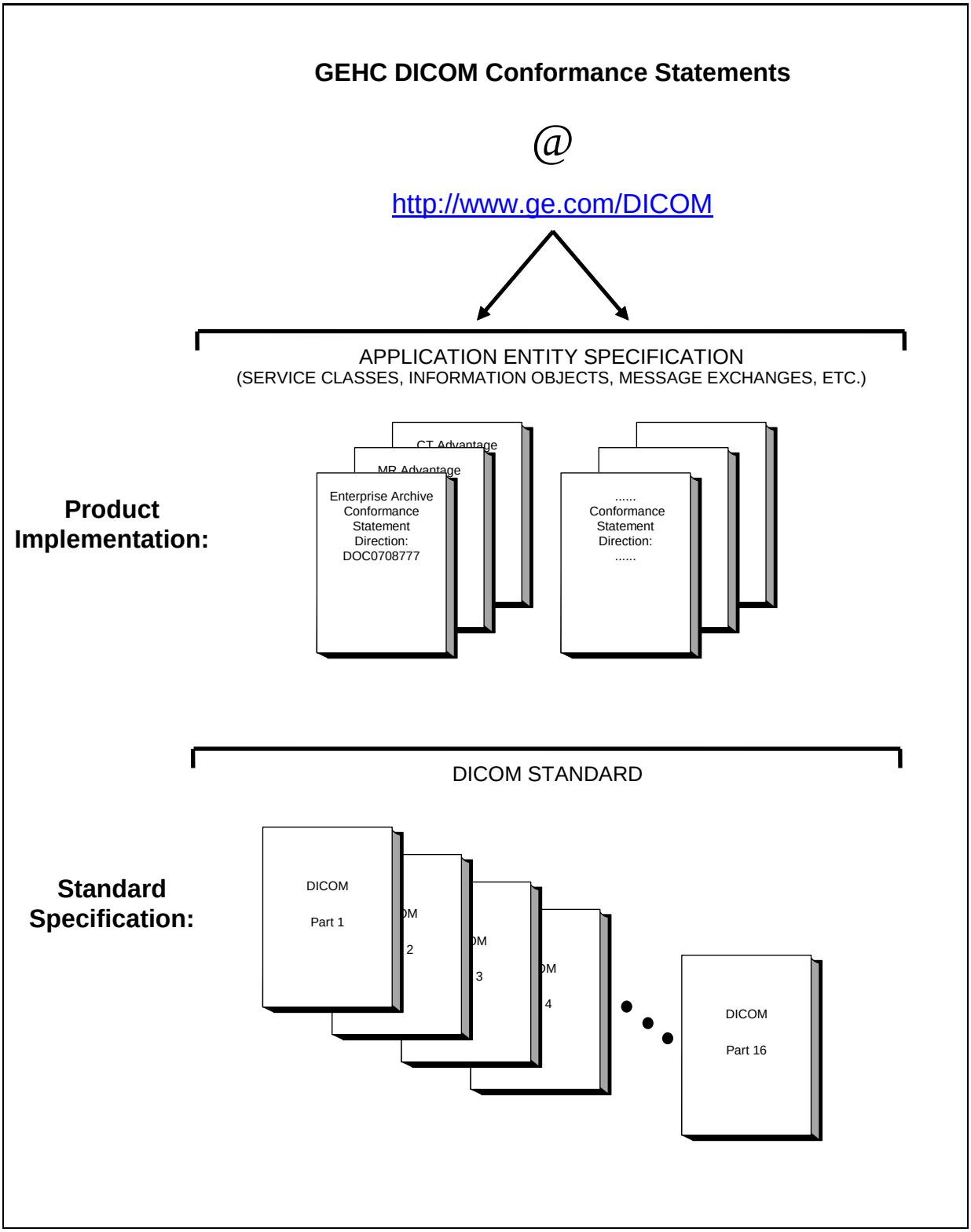
The use of these DICOM Conformance Statements, in conjunction with the DICOM v3.0 Standards, is intended to facilitate communication with GE imaging equipment. However, **by itself, it is not sufficient to ensure that inter-operation will be successful**. The **user (or user's agent)** needs to proceed with caution and address at least four issues:

- **Integration** - The integration of any device into an overall system of interconnected devices goes beyond the scope of standards (DICOM v3.0), and of this introduction and associated DICOM Conformance Statements when interoperability with non-GE equipment is desired. The responsibility to analyze the applications requirements and to design a solution that integrates GE imaging equipment with non–GE systems is the **user's** responsibility and should not be underestimated. The **user** is strongly advised to ensure that such an integration analysis is correctly performed.

- **Validation** - Testing the complete range of possible interactions between any GE device and non–GE devices, before the connection is declared operational, should not be overlooked. Therefore, the **user** should ensure that any non–GE provider accepts full responsibility for all validation required for their connection with GE devices. This includes the accuracy of the image data once it has crossed the interface between the GE imaging equipment and the non–GE device and the stability of the image data for the intended applications.
  Such a validation is required before any clinical use (diagnosis and/or treatment) is performed. It applies when images acquired on GE imaging equipment are processed/displayed on a non-GE device, as well as when images acquired on non-GE equipment is processed/displayed on a GE console or workstation.
- **Future Evolution -** GE understands that the DICOM Standard will evolve to meet the user's growing requirements. GE is actively involved in the development of the DICOM v3.0 Standard. DICOM v3.0 will incorporate new features and technologies and GE may follow the evolution of the Standard. The GE HealthCare protocol is based on DICOM v3.0 as specified in each DICOM Conformance Statement. Evolution of the Standard may require changes to devices that have implemented DICOM v3.0. **In addition, GE reserves the right to discontinue or make changes to the support of communications features (on its products) reflected on by these DICOM Conformance Statements.** The **user** should ensure that any non–GE provider, which connects with GE devices, also plans for the future evolution of the DICOM Standard. Failure to do so will likely result in the loss of function and/or connectivity as the DICOM Standard changes and GE Products are enhanced to support these changes.
- **Interaction** - It is the sole responsibility of the **non–GE provider** to ensure that communication with the interfaced equipment does not cause degradation of GE imaging equipment performance and/or function.

3.3.1 OVERALL DICOM CONFORMANCE STATEMENT DOCUMENT STRUCTURE

The Documentation Structure of the GE HealthCare Conformance Statements and their relationship with the DICOM v3.0 Conformance Statements is shown in the Illustration below.



This document specifies the DICOM implementation. It is entitled:

Enterprise Archive
Conformance Statement for DICOM
Direction DOC2512664

This DICOM Conformance Statement documents the DICOM Conformance Statement and Technical Specification required to interoperate with the GE HealthCare network interface.

The GE HealthCare Conformance Statement, contained in this document, also specifies the Lower Layer communications which it supports (e.g., TCP/IP). However, the Technical Specifications are defined in the DICOM Part 8 standard.
For more information regarding DICOM, copies of the Standard may be obtained on the Internet at https://www.dicomstandard.org/current/.
Comments on the Standard may be addressed to:

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Rosslyn, VA 22209
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3.3.2 SCOPE AND FIELD OF APPLICATION

This document is the DICOM Conformance Statement for version 8.0 of the Enterprise Archive (EA) product line of GE HealthCare IT. The purpose of this document is to describe how the EA product suite collaborates in a DICOM network with other medical imaging applications that conform to the DICOM 3.0 standard.

3.3.3 IMPORTANT CONSIDERATIONS FOR THE READER

This DICOM Conformance Statement by itself is not sufficient to guarantee successful connectivity between EA and equipment from other vendors. The following considerations should be made:
The integration of equipment from different vendors (including GE HealthCare) goes beyond the scope of the DICOM 3.0 standard and the DICOM Conformance Statements from GE HealthCare and other vendors. It is the responsibility of the user (or user's agent) to assess the application requirements and to design a solution that integrates GE HealthCare equipment with equipment from other vendors.
When the comparison of this DICOM Conformance Statement with a DICOM Conformance Statement from another vendor indicates that connectivity should be possible it is the responsibility of the user (or user's agent) to verify this by carrying out validation tests and to check whether all required functionality is met.
With regard to the future evolution of the DICOM 3.0 standard GE HealthCare reserves the right to make changes to the EA architecture described in this document. The user (or user's agent) should ensure that any equipment connected via DICOM to GE HealthCare equipment also follows the future evolution of the DICOM 3.0 standard. Failure to do so may result in (partial) loss of connectivity.

3.3.4 ACKNOWLEDGEMENT OF TRADE NAMES

All trade names mentioned in this document are recognized. Enterprise Archive is a registered trademark of GE HealthCare.

3.4 TERMS AND DEFINITIONS

Informal definitions are provided for the following terms used in this Conformance Statement. The DICOM Standard is the authoritative source for formal definitions of these terms.

Abstract Syntax – the information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples: Verification SOP Class, Modality Worklist Information Model Find SOP Class, Computed Radiography Image Storage SOP Class.

Application Entity (AE) – an end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives DICOM information objects or messages. A single device may have multiple Application Entities.

Application Entity Title – the externally known name of an *Application Entity*, used to identify a DICOM application to other DICOM applications on the network.

Application Context – the specification of the type of communication used between *Application Entities*. Example: DICOM network protocol.

Association – a network communication channel set up between *Application Entities*.

Attribute – – a unit of information in an object definition; a data element identified by a *tag*. The information may be a complex data structure (Sequence), itself composed of lower level data elements. Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), Procedure Code Sequence (0008,1032).

Information Object Definition (IOD) – the specified set of *Attributes* that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. The *Attributes* may be specified as Mandatory (Type 1), Required but possibly unknown (Type 2), or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C). Examples: MR Image IOD, CT Image IOD, Print Job IOD.

Joint Photographic Experts Group (JPEG) – a set of standardized image compression techniques, available for use by DICOM applications.

Media Application Profile – the specification of DICOM information objects and encoding exchanged on removable media (e.g., CDs)

Module – a set of *Attributes* within an *Information Object Definition* that are logically related to each other. Example: Patient Module includes Patient Name, Patient ID, Patient Birth Date, and Patient Sex.

Negotiation – first phase of *Association* establishment that allows *Application Entities* to agree on the types of data to be exchanged and how that data will be encoded.

Presentation Context – the set of DICOM network services used over an *Association*, as negotiated between *Application Entities*; includes *Abstract Syntaxes* and *Transfer Syntaxes*.

Protocol Data Unit (PDU) – a packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.

Security Profile – a set of mechanisms, such as encryption, user authentication, or digital signatures, used by an *Application Entity* to ensure confidentiality, integrity, and/or availability of exchanged DICOM data

Service Class Provider (SCP) – role of an *Application Entity* that provides a DICOM network service; typically, a server that performs operations requested by another *Application Entity* (*Service Class User*). Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).

Service Class User (SCU) – role of an *Application Entity* that uses a DICOM network service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU).

Service/Object Pair (SOP) Class – the specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.

Service/Object Pair (SOP) Instance – an information object; a specific occurrence of information exchanged in a *SOP Class*. Examples: a specific x-ray image.
Tag – a 32-bit identifier for a data element, represented as a pair of four digit hexadecimal numbers, the "group" and the "element". If the "group" number is odd, the tag is for a private (manufacturer-specific) data element. Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element].

Transfer Syntax – the encoding used for exchange of DICOM information objects and messages. Examples: *JPEG* compressed (images), little endian explicit value representation.

Unique Identifier (UID) – a globally unique "dotted decimal" string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.

Value Representation (VR) – the format type of an individual DICOM data element, such as text, an integer, a person's name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.

3.5 SCOPE AND FIELD OF APPLICATION

It is the intent of this document to provide an unambiguous specification for GE HealthCare implementations. This specification, called a Conformance Statement, includes a DICOM Conformance Statement and is necessary to ensure proper processing and interpretation of GE HealthCare medical data exchanged using DICOM. The GE HealthCare Conformance Statements are available to the public.
The reader of this DICOM Conformance Statement should be aware that different GE HealthCare devices are capable of using different Information Object Definitions. For example, a GE HealthCare CT Scanner may send instances using the CT Information Object, MR Information Object, Secondary Capture Object, etc.
Included in this DICOM Conformance Statement are the Module Definitions, which define all data elements, used by this GE HealthCare implementation. If the user encounters unspecified private data elements while parsing a GE HealthCare Data Set, the user is well advised to ignore those data elements (per the DICOM standard). Unspecified private data element information is subject to change without notice. If, however, the device is acting as a "full fidelity storage device", it should retain and re-transmit all of the private data elements that are sent by GE HealthCare devices.

3.6 BASICS OF DICOM COMMUNICATION

This section describes terminology used in this Conformance Statement for the non-specialist. The key terms used in the Conformance Statement are highlighted in italics below. This section is not a substitute for training about DICOM, and it makes many simplifications about the meanings of DICOM terms.
Two Application Entities (devices) that want to communicate with each other over a network using DICOM protocol must first agree on several things during an initial network "handshake". One of the two devices must initiate an Association (a connection to the other device), and ask if specific services, information, and encoding can be supported by the other device (Negotiation).
DICOM specifies a number of network services and types of information objects, each of which is called an Abstract Syntax for the Negotiation. DICOM also specifies a variety of methods for encoding data, denoted Transfer Syntaxes. The Negotiation allows the initiating Application Entity to propose combinations of Abstract Syntax and Transfer Syntax to be used on the Association; these combinations are called Presentation Contexts. The receiving Application Entity accepts the Presentation Contexts it supports.
For each Presentation Context, the Association Negotiation also allows the devices to agree on Roles – which one is the Service Class User (SCU - client) and which is the Service Class Provider (SCP - server). Normally the device initiating the connection is the SCU, i.e., the client system calls the server, but not always.
The Association Negotiation finally enables exchange of maximum network packet (PDU) size, security information, and network service options (called Extended Negotiation information). The Application Entities, having negotiated the Association parameters, may now commence exchanging data. Common data exchanges include queries for worklists and lists of stored images, transfer of image objects and analyses (structured reports), and sending images to film printers. Each exchangeable unit of data is formatted by the sender in accordance with the appropriate Information Object Definition, and sent using the negotiated Transfer Syntax. There is a Default Transfer Syntax that all systems must accept, but it may not be the most efficient for some use cases. Each transfer is explicitly acknowledged by the receiver with a Response Status indicating success, failure, or that query or retrieve operations are still in process.

3.7 ABBREVIATIONS

AE	Application Entity
AET	Application Entity Title
CAD	Computer Aided Detection
CDA	Clinical Document Architecture
CSE	Customer Service Engineer
CR	Computed Radiography
CT	Computed Tomography
DHCP	Dynamic Host Configuration Protocol
DICOM	Digital Imaging and Communications in Medicine
DNS	Domain Name System
DX	Digital X-ray
GSPS	Grayscale Softcopy Presentation State
HIS	Hospital Information System
HL7	Health Level 7 Standard
IHE	Integrating the Healthcare Enterprise
IOD	Information Object Definition
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISO	International Organization for Standards
IO	Intra-oral X-ray
JPEG	Joint Photographic Experts Group
LDAP	Lightweight Directory Access Protocol
LUT	Look-up Table
MPEG	Moving Picture Experts Group
MG	Mammography (X-ray)
MPPS	Modality Performed Procedure Step
MR	Magnetic Resonance Imaging
MSPS	Modality Scheduled Procedure Step
MTU	Maximum Transmission Unit (IP)
MWL	Modality Worklist
NM	Nuclear Medicine
NTP	Network Time Protocol
O	Optional (Key Attribute)
OP	Ophthalmic Photography
OSI	Open Systems Interconnection
PACS	Picture Archiving and Communication System
PET	Positron Emission Tomography
PDU	Protocol Data Unit
QIDO	Query based on ID for DICOM Objects
R	Required (Key Attribute)
RDN	Relative Distinguished Name (LDAP)
RF	Radiofluoroscopy
RIS	Radiology Information System
RT	Radiotherapy
SC	Secondary Capture
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
SPS	Scheduled Procedure Step
SR	Structured Reporting
STOW-RS	STore Over the Web by RESTful Services
TCP/IP	Transmission Control Protocol/Internet Protocol
U	Unique (Key Attribute)
UL	Upper Layer
US	Ultrasound

VL	Visible Light
VR	Value Representation
WADO	Web Access of DICOM Objects
WSI	Whole Slide Microscopy Image
XA	X-ray Angiography

3.8 REFERENCES

Name	Description
NEMA PS3	Digital Imaging and Communications in Medicine (DICOM) Standard, available free at https://www.dicomstandard.org/
Enterprise Archive V8.0 User Guide	Manual that describes the basic configuration of the system.
Enterprise Archive V8.0 Reference Guide	Manual that describes the detailed configuration of the system.

4 NETWORKING

4.1 IMPLEMENTATION MODEL

Enterprise Archive, or EA, is implemented as a set of services with a configurable set of archives, each represented by an Application Entity. These Archive Application Entities can initiate associations with remote application entities and accept associations from them as well.
The forwarding of modality procedure step events uses an additional Application Entity named Modality Procedure Step Forwarder in this document.

4.1.1 Application Data Flow Diagram

The Implementation Model for the EA is depicted in the diagrams below.

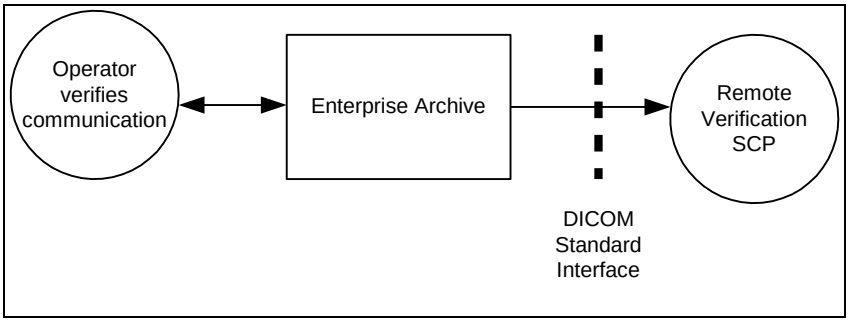

Figure 1 Verify a Remote System

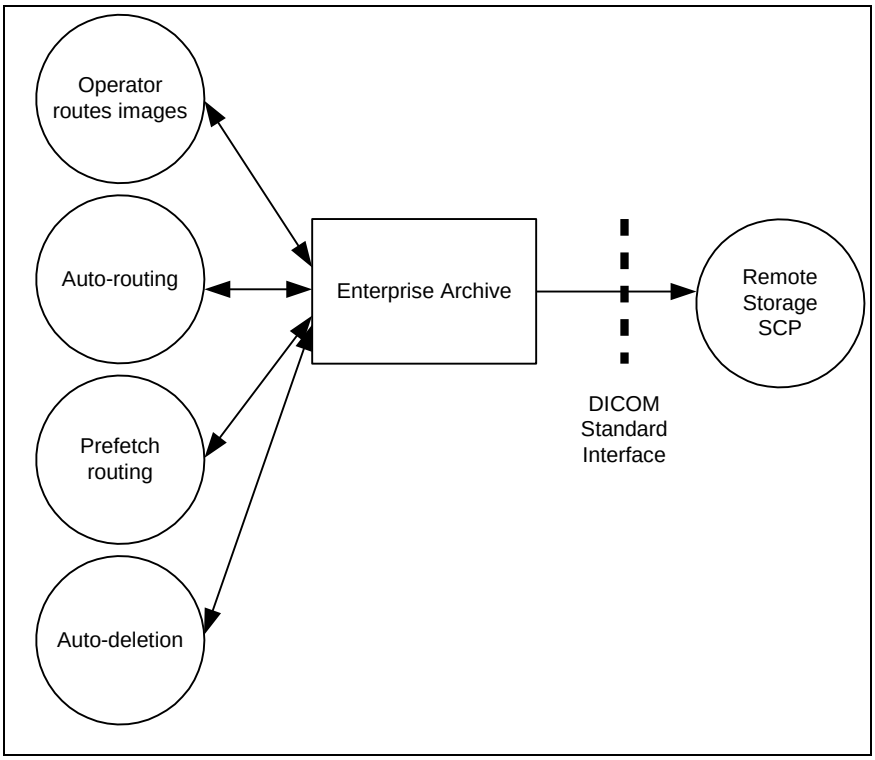

Figure 2 Send Instances to a Remote System

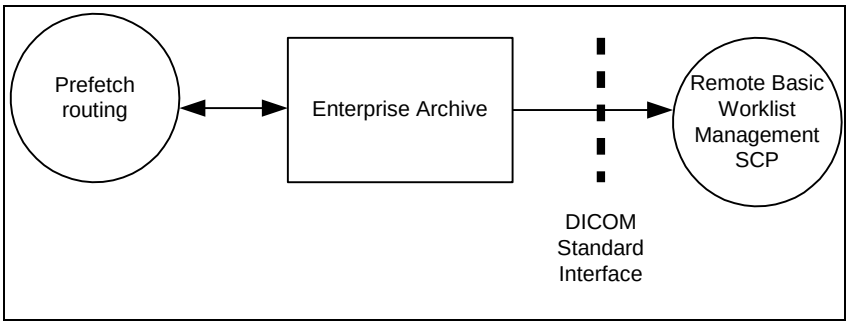

Figure 3 Retrieve a Modality Worklist from a Remote System

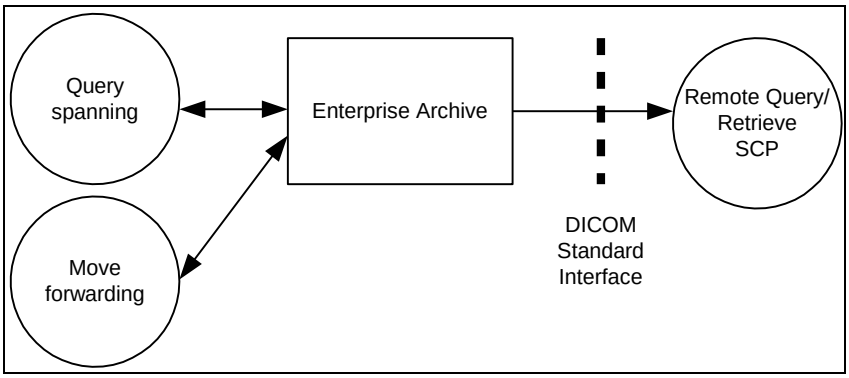

Figure 4 Query Spanning or Move Forwarding

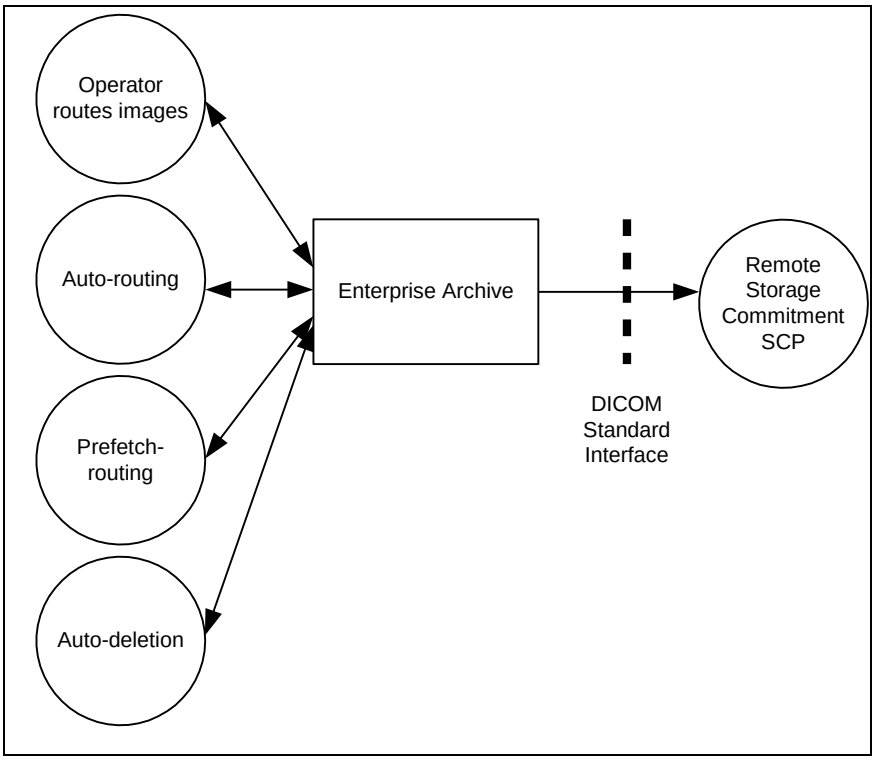

Figure 5 Verify the Committed Storage of Instances on a Remote System

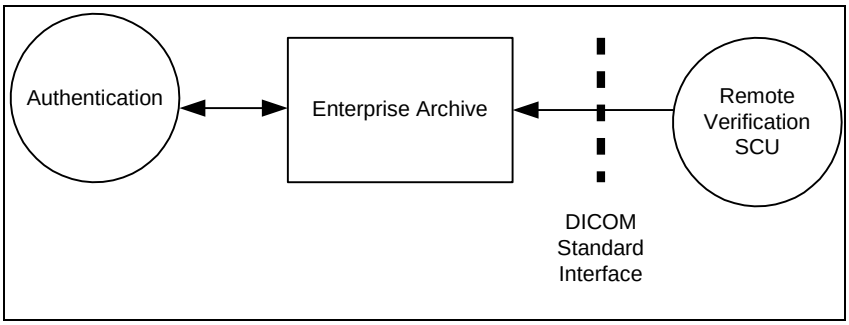

Figure 6 Verify communication with a remote system

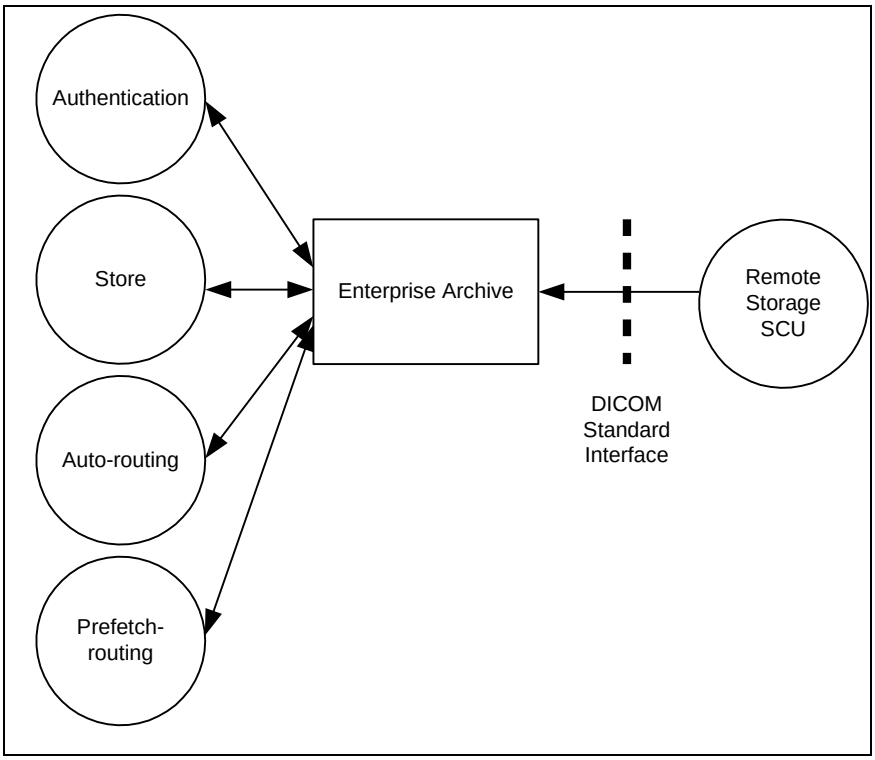

Figure 7 Receive Instances from a Remote System

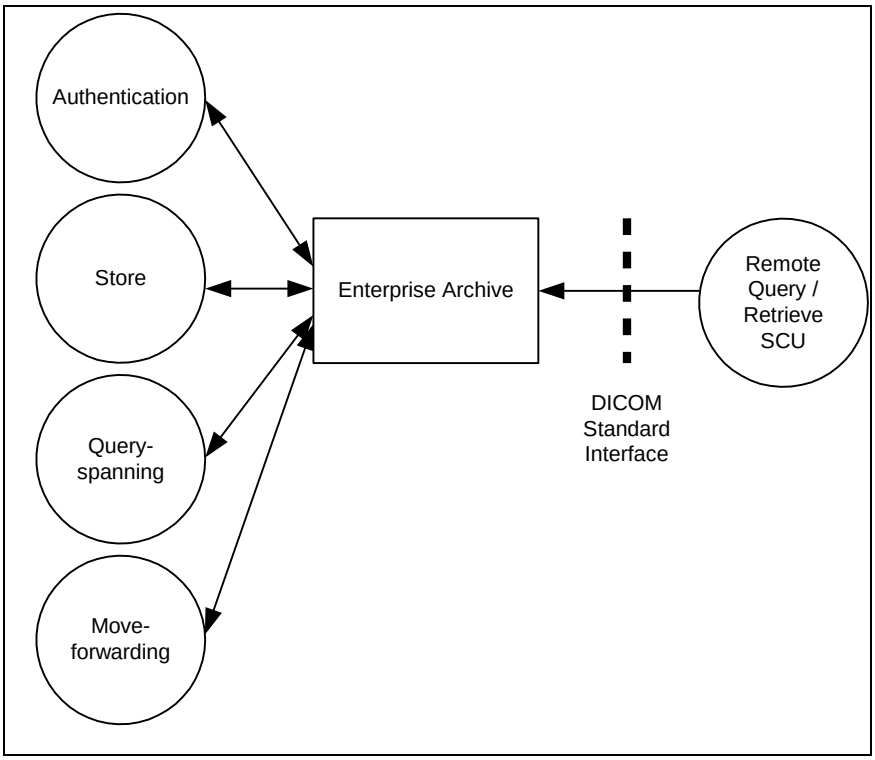

Figure 8 External SCU Queries the EA Database

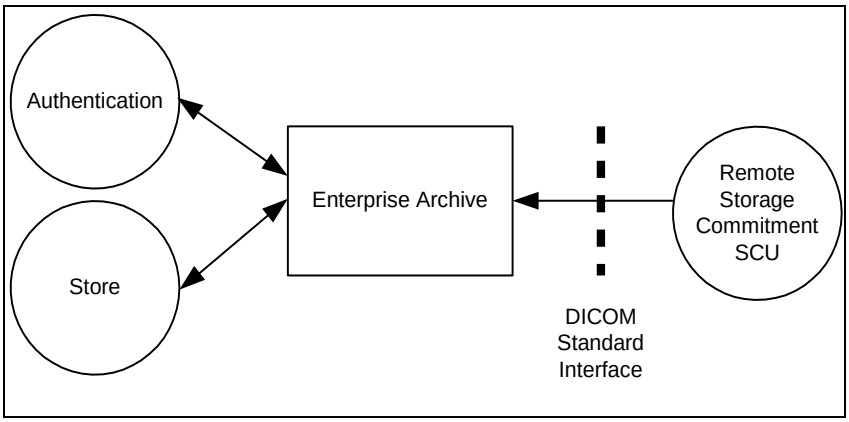

Figure 9 Commit Storage of Instances in the EA Database

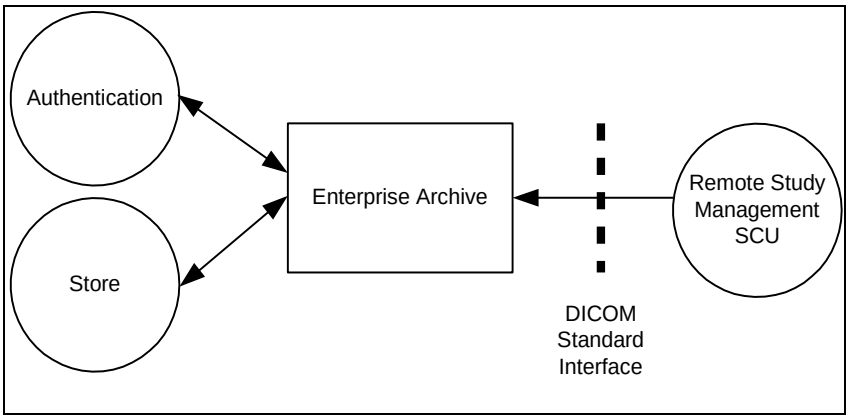

Figure 10 Receive a Study Change Request or Event from a Remote System

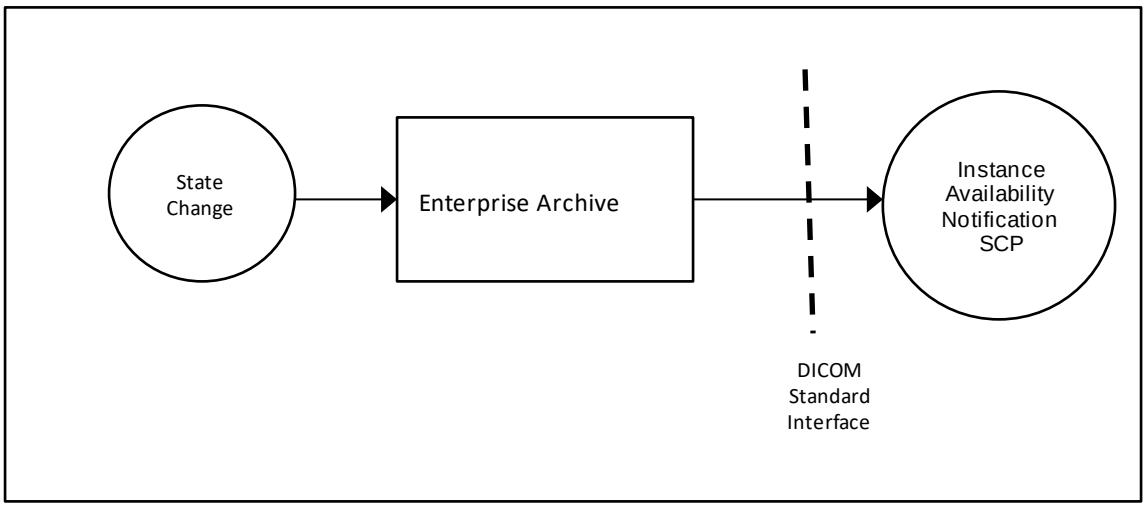

Figure 11. Send an instance availability state change

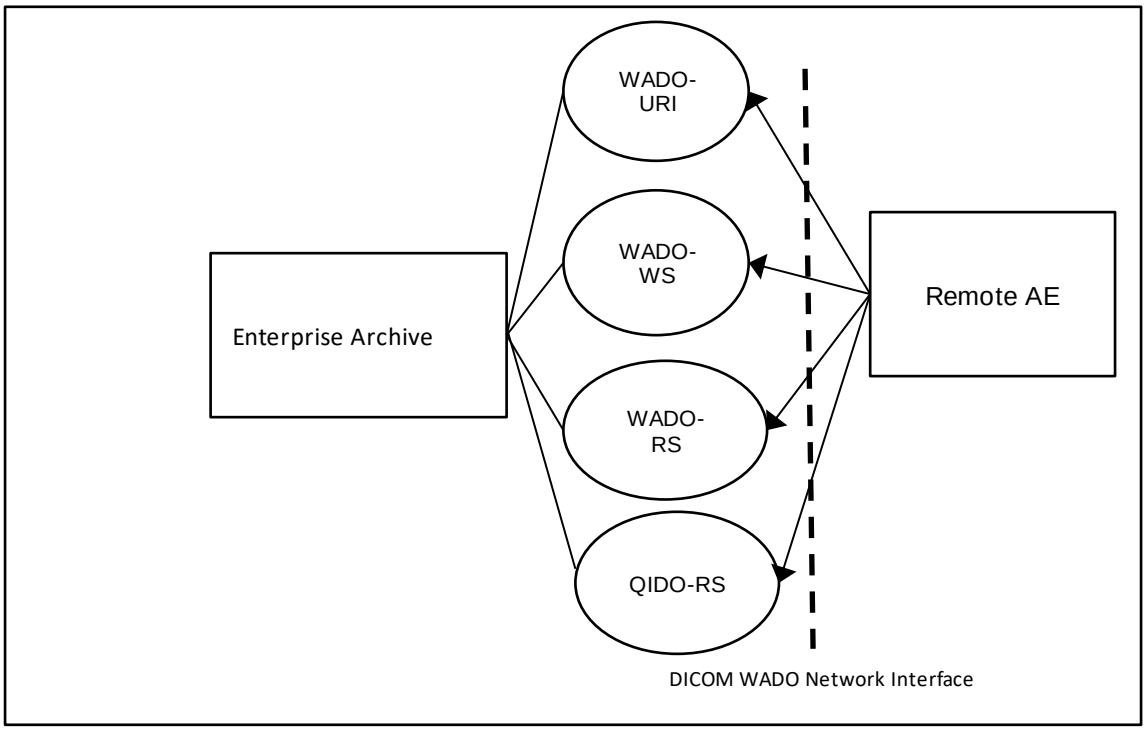

Figure 12. Request of DICOM Persistent Object by WADO Network interface

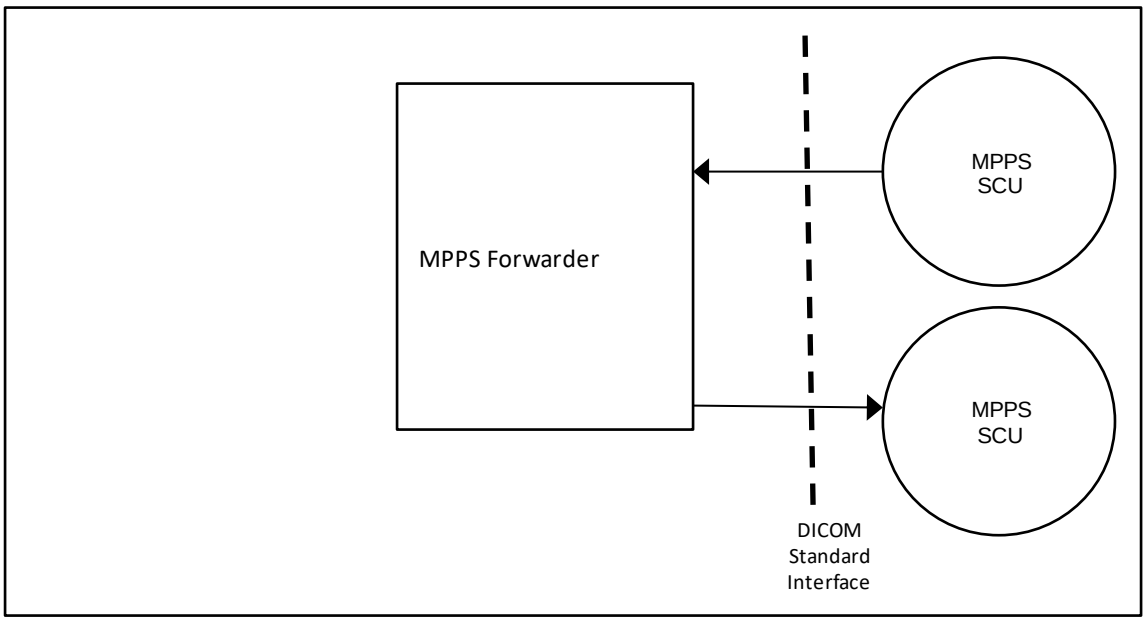

Figure 13. Forwarding MPPS messages. EA is acting as the Modality Procedure Step Forwarder Application Entity.

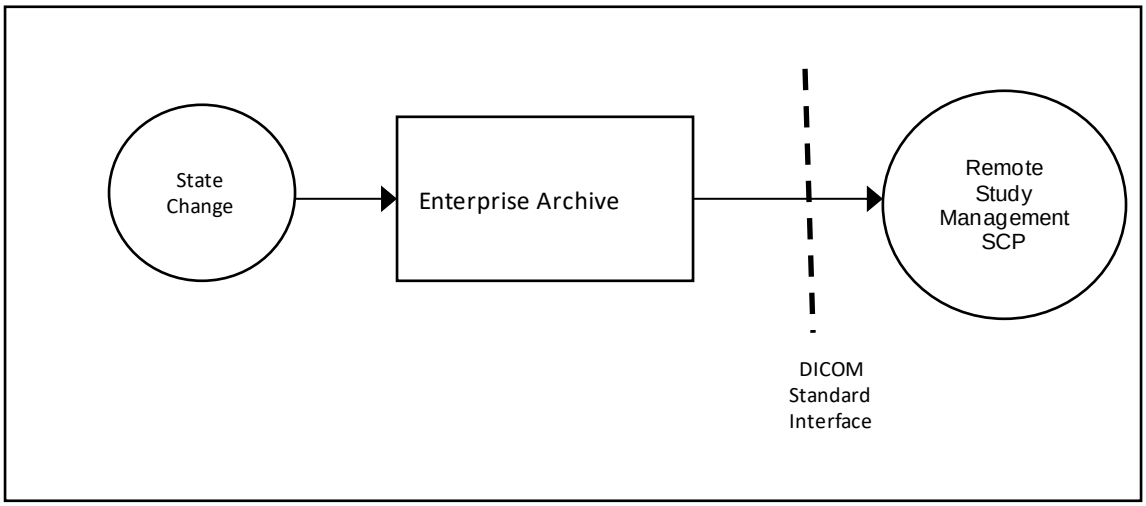

Figure 14. Convey a Study Change Request or Event to a Remote System

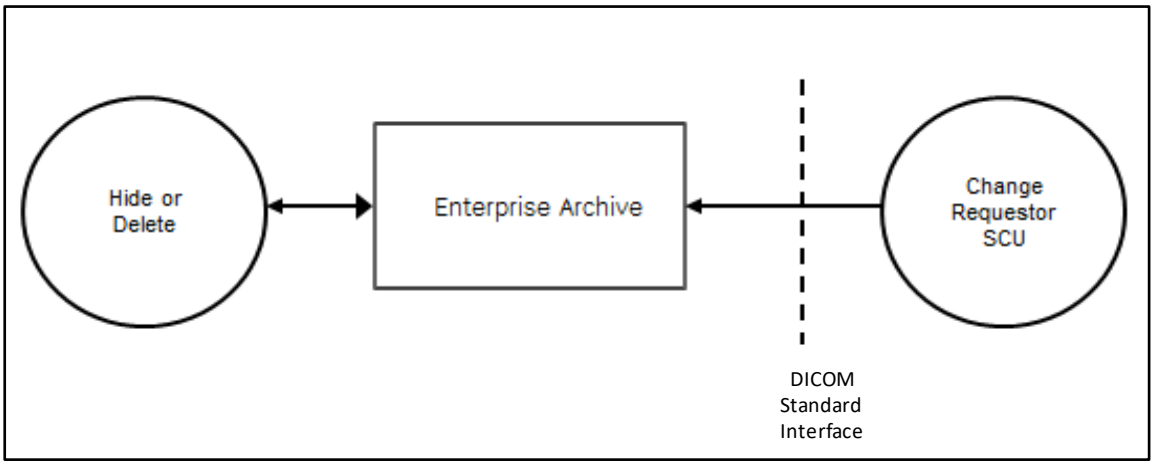

Figure 15. IHE IOCM Workflow

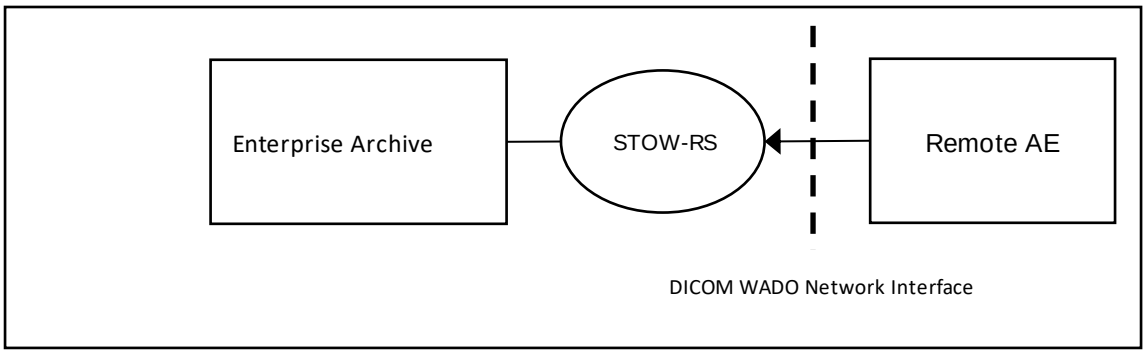

Figure 16. Store of DICOM Persistent Object by WADO Network interface

4.1.2 Functional Definitions of Application Entities

4.1.2.1 Functional Definition of Enterprise Archive Application Entity

EA can be configured into multiple “partitions” or archives. Each archive is presented to the outside world as an Application Entity with its own AE title. Each archive provides its own physical storage and index database. For example, if a single instance is sent to two EA archives, two copies of the instance are store: one in each archive. Instances stored in one archive cannot be obtained via another archive.

All DICOM functionality, both SCP and SCU roles, is available for each archive, but each archive can be configured differently.
EA Archive can be configured as

- Regular Archive – Used in VNA deployment
- PACS Archive – Edison True PACS deployment

4.1.2.2 Functional Definition of MPPS Forwarder Application Entity

EA can be configured to forward Modality Procedure Step requests received to configured destinations. Purpose is to support MPPS SCU Clients that can only send to a single destination.

4.1.2.3 Functional Definition of IHE IOCM

EA can accept IHE IOCM Rejection notes from an Application Entity that has suitable update and/or delete permissions. The instances listed in the Rejection Note are permanently deleted if the Rejection Note title is "Data Retention Policy Expired" or are hidden for normal retrieval when any of the other titles are specified. Instances are hidden by setting the private data element Reject Status to the value "1".

4.1.3 Sequencing of Real World Activities

The following scenarios relate different activities in time:

Auto Routing
Receive Instances => Send Instances
EA supports auto-routing to facilitate the distribution of instances to other Application Entities. If auto-routing is enabled, each study is also routed to one or more remote Application Entities after its arrival in EA.

Prefetching and Routing
Receive Instances => Send Instances
EA supports prefetching of prior studies based on incoming instance characteristics to facilitate the availability of historical information. If prefetching for incoming studies is enabled, each incoming study triggers the prefetch of priors. These priors can then be routed to one or more remote Application Entities.

Query Spanning
Query => Span a Query
EA supports query-spanning to facilitate querying instances that are distributed over several Application Entities. If the query-spanning feature is enabled, a query performed on EA will cause EA to span the query to one or more remote Application Entities. Both the results from the local query and the remote queries will be merged and returned to the querying client.

Auto-Delete
Receive Instances => Commit Storage of Instances
If auto-deletion is enabled, the stored instances are not permanently kept into AE. A storage commitment request can thus return a failure for deleted instances.

Move-Forwarding
Receive Move Request => Forward a Move Request.

State Change
Instances updated => Convey a Study Change Request or Event to a Remote System
EA supports sending a Study Change Request using Detached Study Management SOP class to other Application Entities to facilitate in keeping instances at the destination up to date.

Authentication
Request authentication=>Reply authentication
EA supports authentication/authorization of remote clients where unauthorized access to an archive is rejected if access is not configured to be allowed.

Operator routes images
Operator requests route=>images routed
EA supports the routing of images stored in the archive to any known destination from the Application Console.

Operator IHE IOCM Rejection Notes Processing
Operator receive=>rejection note processed
EA supports the processing of IHE IOCM Rejection notes with either deletion of the instances or setting the rejection status of an instance.

4.2 AE SPECIFICATIONS

4.2.1 Enterprise Archive Application Entity Specification

The detail of the Application Entity of an archive is specified under this section. Note that there can be one or more of these archives configured in the system.

4.2.1.1 SOP Classes

This Application Entity provides Standard Conformance to the following SOP Classes:

Table 2 Standard Non-Storage SOP Classes

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	Yes
Patient Root Query/Retrieve Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Yes	Yes
Patient Root Query/Retrieve Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Yes	Yes
Study Root Query/Retrieve Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Yes	Yes
Study Root Query/Retrieve Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Yes	Yes
Storage Commitment Push Model	1.2.840.10008.1.20.1	Yes	Yes
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Yes	No
Detached Study Management	1.2.840.10008.3.1.2.3.1	Yes	Yes
Instance Availability Notification	1.2.840.10008.5.1.4.33	Yes	No

Additionally EA supports the following private non-storage SOP classes.

Table 3 Private Non-Storage SOP Classes

SOP Class Name	SOP Class UID	SCU	SCP
GE Private Detailed Detached Study Management	1.2.528.1.1001.3.1.2.3.1	Yes	Yes

The following standard storage SOP classes are supported:

Table 4 Standard Storage SOP Classes

SOP Class Name	SOP Class UID	SCU	SCP
CR Image Storage	1.2.840.10008.5.1.4.1.1.1	Yes	Yes
Digital X-Ray Image (Presentation) Storage	1.2.840.10008.5.1.4.1.1.1.1	Yes	Yes
Digital X-Ray Image (Process) Storage	1.2.840.10008.5.1.4.1.1.1.1.1	Yes	Yes
DX Mammography Image (Presentation) Storage	1.2.840.10008.5.1.4.1.1.1.2	Yes	Yes
DX Mammography Image (Process) Storage	1.2.840.10008.5.1.4.1.1.1.2.1	Yes	Yes
DX Intra-oral Image (Presentation) Storage	1.2.840.10008.5.1.4.1.1.1.3	Yes	Yes

DX Intra-oral Image (Process) Storage	1.2.840.10008.5.1.4.1.1.1.3.1	Yes	Yes
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	Yes
Enhanced CT Image Storage	1.2.840.10008.5.1.4.1.1.2.1	Yes	Yes
US Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.3	Yes	Yes
US Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Yes	Yes
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Yes	Yes
Enhanced MR Image Storage	1.2.840.10008.5.1.4.1.1.4.1	Yes	Yes
MR Spectroscopy Storage	1.2.840.10008.5.1.4.1.1.4.2	Yes	Yes
NM Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.5	Yes	Yes
US Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.6	Yes	Yes
US Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Yes	Yes
Enhanced US Volume Storage	1.2.840.10008.5.1.4.1.1.6.2	Yes	Yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Yes	Yes
Multi-Frame Single Bit Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.1	Yes	Yes
Multi-Frame Grayscale Byte Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.2	Yes	Yes
Multi-Frame Grayscale Word Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.3	Yes	Yes
Multi-Frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Yes	Yes
Standalone Overlay Storage	1.2.840.10008.5.1.4.1.1.8	Yes	Yes
Standalone Curve Storage	1.2.840.10008.5.1.4.1.1.9	Yes	Yes
12-lead ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.1	Yes	Yes
General ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.2	Yes	Yes
Ambulatory ECG Waveform Storage	1.2.840.10008.5.1.4.1.1.9.1.3	Yes	Yes
Hemodynamic Waveform Storage	1.2.840.10008.5.1.4.1.1.9.2.1	Yes	Yes
Cardiac Electrophysiology Waveform Storage	1.2.840.10008.5.1.4.1.1.9.3.1	Yes	Yes
Basic Voice Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.1	Yes	Yes
General Audio Waveform Storage	1.2.840.10008.5.1.4.1.1.9.4.2	Yes	Yes
Arterial Pulse Waveform Storage	1.2.840.10008.5.1.4.1.1.9.5.1	Yes	Yes
Respiratory Waveform Storage	1.2.840.10008.5.1.4.1.1.9.6.1	Yes	Yes
Standalone Modality LUT Storage	1.2.840.10008.5.1.4.1.1.10	Yes	Yes
Standalone VOI LUT Storage	1.2.840.10008.5.1.4.1.1.11	Yes	Yes
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1	Yes	Yes
Color Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.2	Yes	Yes
Pseudo-Color Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.3	Yes	Yes
Blending Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.4	Yes	Yes
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1	Yes	Yes
Enhanced XA Image Storage	1.2.840.10008.5.1.4.1.1.12.1.1	Yes	Yes
X-Ray Radiofluoroscopic Image Storage	1.2.840.10008.5.1.4.1.1.12.2	Yes	Yes
Enhanced XRF Image Storage	1.2.840.10008.5.1.4.1.1.12.2.1	Yes	Yes
X-Ray Angiographic Bi-Plane Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.12.3	Yes	Yes
X-Ray 3D Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.13.1.1	Yes	Yes
X-Ray 3D Craniofacial Image Storage	1.2.840.10008.5.1.4.1.1.13.1.2	Yes	Yes
Breast Tomosynthesis Image Storage	1.2.840.10008.5.1.4.1.1.13.1.3	Yes	Yes
Breast Projection X-Ray Image Storage - For Presentation	1.2.840.10008.5.1.4.1.1.13.1.4	Yes	Yes
Breast Projection X-Ray Image Storage - For Processing	1.2.840.10008.5.1.4.1.1.13.1.5	Yes	Yes
Intravascular Optical Coherence Tomography Image Storage – For Presentation	1.2.840.10008.5.1.4.1.1.14.1	Yes	Yes
Intravascular Optical Coherence Tomography Image Storage – For Processing	1.2.840.10008.5.1.4.1.1.14.2	Yes	Yes
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20	Yes	Yes
Raw Data Storage	1.2.840.10008.5.1.4.1.1.66	Yes	Yes
Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.1	Yes	Yes

Spatial Fiducials Storage	1.2.840.10008.5.1.4.1.1.66.2	Yes	Yes
Deformable Spatial Registration Storage	1.2.840.10008.5.1.4.1.1.66.3	Yes	Yes
Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.4	Yes	Yes
Surface Segmentation Storage	1.2.840.10008.5.1.4.1.1.66.5	Yes	Yes
Real World Value Mapping Storage	1.2.840.10008.5.1.4.1.1.67	Yes	Yes
VL Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.77.1	Yes	Yes
VL Multi-frame Image Storage (Retired)	1.2.840.10008.5.1.4.1.1.77.2	Yes	Yes
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Yes	Yes
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	Yes	Yes
VL Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2	Yes	Yes
Video Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.2.1	Yes	Yes
VL Slide-Coordinates Microscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.3	Yes	Yes
VL Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4	Yes	Yes
Video Photographic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.4.1	Yes	Yes
Ophthalmic Photography 8 Bit Storage	1.2.840.10008.5.1.4.1.1.77.1.5.1	Yes	Yes
Ophthalmic Photography 16 Bit Storage	1.2.840.10008.5.1.4.1.1.77.1.5.2	Yes	Yes
Stereometric Relationship Storage	1.2.840.10008.5.1.4.1.1.77.1.5.3	Yes	Yes
Ophthalmic Tomography Image Storage	1.2.840.10008.5.1.4.1.1.77.1.5.4	Yes	Yes
VL Whole Slide Microscopy Image Storage	1.2.840.10008.5.1.4.1.1.77.1.6	Yes	Yes
Basic Text SR	1.2.840.10008.5.1.4.1.1.88.11	Yes	Yes
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	Yes	Yes
Comprehensive SR	1.2.840.10008.5.1.4.1.1.88.33	Yes	Yes
Comprehensive SR 3D	1.2.840.10008.5.1.4.1.1.88.34	Yes	Yes
Procedure Log	1.2.840.10008.5.1.4.1.1.88.40	Yes	Yes
Mammography CAD SR Storage	1.2.840.10008.5.1.4.1.1.88.50	Yes	Yes
Key Object Selection Document	1.2.840.10008.5.1.4.1.1.88.59	Yes	Yes
Chest CAD SR	1.2.840.10008.5.1.4.1.1.88.65	Yes	Yes
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	Yes	Yes
Radiopharmaceutical Radiation Dose SR Storage	1.2.840.10008.5.1.4.1.1.88.68	Yes	Yes
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	Yes
Encapsulated CDA Storage	1.2.840.10008.5.1.4.1.1.104.2	Yes	Yes
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128	Yes	Yes
Standalone PET Curve Storage (Retired)	1.2.840.10008.5.1.4.1.1.129	Yes	Yes
Basic Structured Display Storage	1.2.840.10008.5.1.4.1.1.131	Yes	Yes
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	Yes	Yes
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	Yes	Yes
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	Yes	Yes
RT Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.4	Yes	Yes
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	Yes	Yes
RT Brachy Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.6	Yes	Yes
RT Treatment Summary Record Storage	1.2.840.10008.5.1.4.1.1.481.7	Yes	Yes
RT Ion Plan Storage	1.2.840.10008.5.1.4.1.1.481.8	Yes	Yes
RT Ion Beams Treatment Record Storage	1.2.840.10008.5.1.4.1.1.481.9	Yes	Yes

Note: Currently for Digital Pathology SOP class – “VL Whole Slide Microscopy Image Storage” only C-STORE (SCU/SCP) operations are supported using JPEG Lossy or JPEG2000 Lossy Transfer Syntax.

By altering the configuration, it is possible to support additional or fewer Storage SOP Classes.

The following private storage SOP classes are also supported both as SCU and SCP.

Table 5 Private Storage SOP Classes

SOP Class Name	SOP Class UID	SCU	SCP

GE Collage Storage	1.2.528.1.1001.5.1.1.1	Yes	Yes
GE Private DICOM RT Plan Storage	1.2.840.113619.4.5.249	Yes	Yes
GE eNTEGRA Storage (Xeleris/eNTEGRA Protocol Data or NM Genie)	1.2.840.113619.4.27	Yes	Yes
GE 3D Model Image Storage (GE Advantage 3D XR)	1.2.840.113619.4.26	Yes	Yes
GE PET Advance Raw Data Storage (GE Advantage Workstation Raw)	1.2.840.113619.4.30	Yes	Yes
GE Private Structure Display	1.2.840.113619.4.41	Yes	Yes
PhilipsLive3D01 (Philips HP Sonos 7500)	1.2.840.113543.6.6.1.3.10001	Yes	Yes
PhilipsLive3D02 (Philips HP Sonos 7500)	1.2.840.113543.6.6.1.3.10002	Yes	Yes
Tomtec Annotation Private	1.2.276.0.48.5.1.4.1.1.7	Yes	Yes
Philips Private Gyroscan MR Series Data Storage	1.3.46.670589.11.0.0.12.2	Yes	Yes
Philips Private Specialized X-Ray Storage	1.3.46.670589.2.3.1.1	Yes	Yes
Fuji Private CR Storage	1.2.392.200036.9125.1.1.2	Yes	Yes
Philips Private 3D Volume Storage	1.3.46.670589.5.0.1.1	Yes	Yes
Philips Private 3D Presentation State	1.3.46.670589.2.5.1.1	Yes	Yes

By altering the configuration it is possible to support additional or fewer Private Storage SOP Classes.

This AE complies with PS 3.18 specifications for both WS and URI access. The following WADO Network services are provided:

Table 6. Supported WADO Network Services

WADO Network Services	User of Service	Provider of Service
WADO - URI - Retrieve Imaging Document	No	Yes
WADO - URI - Retrieve Rendered Imaging Document	No	Yes
WADO - WS - Retrieve Imaging Document Set	No	Yes
WADO - RS – RetrieveStudy	No	Yes
WADO - RS – RetrieveSeries	No	Yes
WADO - RS – RetrieveInstance	No	Yes
WADO - RS – RetrieveFrames	No	Yes
WADO - RS – RetrieveBulkdata	No	Yes
WADO - RS – RetrieveMetadata	No	Yes
QIDO – RS – SearchForStudies	No	Yes
QIDO – RS – SearchForSeries	No	Yes
QIDO – RS – SearchForInstances	No	Yes
STOW – RS – StoreInstances	No	Yes

4.2.1.2 Association Policies

This section describes the general association establishment and acceptance policies for the Archive AE.

4.2.1.2.1 General

The DICOM standard Application Context Name for DICOM is always proposed:

Application Context Name	1.2.840.10008.3.1.1.1.

The user information Items sent by this product are:
- Maximum PDU length
- Implementation UID
- Implementation Version Name

EA rejects association requests from applications of which the AE Title is not registered within EA's administration unless it is configured to accept any AE Title.

Each AE Title maps to an archive; per archive registration specifies which services are available to a remote system. If the remote system is not listed in the registration of the connected archive (AE Title) the association is declined.
If the remote system is not authorized for the requested SOP class it is rejected.

EA will support 3 additional AE Titles for PACS Archive with _C, _V and _R suffixed to the Archive's AE Title. ("C-Complete", "V-Verified", "R-Reference Only".)

4.2.1.2.2 Number of Associations

EA supports multiple associations both as an SCU and SCP.

Table 7. Number of associations as an association initiator

Maximum number of simultaneous associations	Configurable (default: 2).

Table 8. Number of associations as an association acceptor

Maximum number of simultaneous associations	1000 (non-configurable)

4.2.1.2.3 Asynchronous Nature

The implementation supports asynchronous communication (multiple outstanding transactions over a single Association).

Table 9 Asynchronous Nature

Maximum number of outstanding asynchronous transactions	0 (unlimited) (non-configurable)

4.2.1.2.4 Implementation Identifying Information

Table 10 Implementation Details

Implementation Class UID	1.2.528.1.1001.2.800.8.0.<buildnumber>
Implementation Version Name	EA8 <buildnumber>

where <buildnumber> is the Enterprise Archive software build number.

4.2.1.3 Association Initiation Policy

4.2.1.3.1 Activity - Verify Connectivity

Description and Sequencing of Activities

The operator can choose to verify a remote Application Entity. EA sends out a verification request to a remote Application Entity.

Proposed Presentation Contexts

Table 11 Presentation Context Table for Verify Connection

Abstract Syntax		Transfer Syntax		Role	Extended
Name	**UID**	**Name**	**UID**		**Negotiation**
Verification	1.2.840.10008.1.1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCU	None

SOP Specific Conformance Statement

EA provides standard conformance. In case of failure the verification is not retried.

4.2.1.3.2 Activity - Send Instances

Description and Sequencing of Activities

The following activities can trigger EA to send instances to one or more remote Application Entities:

- The operator requesting the transmission of a study.
- EA accepts the move request of a remote Application Entity.
- The prefetch engine determines the route of a historical study (prior).
- EA automatically routes an incoming study.

Proposed Presentation Contexts

Table 12 Presentation Context Table for Send Instances

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	**UID**			
Default Application SOP Classes	See 4.2.1.1 SOP Classes	See Table 13	SCU	None

Table 13 Transfer Syntaxes for Send Instances

Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
Explicit VR Big Endian	1.2.840.10008.1.2.2
JPEG Baseline, Lossy JPEG 8-Bit Image Compression	1.2.840.10008.1.2.4.50
JPEG Extended, Lossy JPEG 12-Bit Image Compression	1.2.840.10008.1.2.4.51
JPEG Lossless, Non-Hierarchical, First-Order Prediction, Lossless JPEG Image Compression	1.2.840.10008.1.2.4.70
JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90
JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91
MPEG2 Main Profile @ Main Level	1.2.840.10008.1.2.4.100
MPEG-4 AVC/H.264 High Profile / Level 4.1	1.2.840.10008.1.2.4.102
MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1	1.2.840.10008.1.2.4.103
RLE Lossless	1.2.840.10008.1.2.5

SOP Specific Conformance Statement

EA provides full (level 2) conformance. This means that upon sending an instance received via DICOM it will send out all attributes that it received (this includes private attributes from other vendors).

By default EA proposes the transfer syntax as it is found in the stored instance file and the default transfer syntax. (Note what is referred to, as 'the default transfer' can be more than one transfer syntax. By default Explicit Little Endian and Implicit Little Endian are used as 'default transfer syntax').

For compressed images this leads to the following situation. An image can be present in EA with a specific compression scheme (either because it was sent compressed, or because it was compressed by EA upon reception). When sending this image, the first proposed transfer syntax by EA is the transfer syntax of the image. If the client does not support the required transfer syntax, the image will be converted to the best-fit transfer syntax before it is sent. This behavior applies to lossy transfer syntaxes and lossless transfer syntaxes.

If the instance is stored in the JPEG 2000 (Lossless Only) transfer syntax EA will also offer the JPEG Lossless Transfer Syntax. If this is the only transfer syntax accepted EA will convert the instance before it is sent.

Instances stored in the MPEG2 Main Profile @ Main Level transfer syntax are only offered in this transfer syntax. EA will in this case not offer the default transfer syntax.

Send Retry Note
In general send operations will be retried unless it is a sub-operation of a C-MOVE request. In that case the error is propagated back the requestor of the C-MOVE requests. The number of retries can be configured. If EA fails to complete the transfer within the maximum number of retries the transfer is marked as failed and EA will no longer retry the transfer.

Table 14. DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Instance is stored	0000	Operation is considered complete.
Warning		Bxxx	Error code is logged. Operation is considered complete.
Failure		*	The failure is logged and the operation is retried (see send retry note)

Table 15. DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is aborted using A-ABORT and the command is marked as failed. The reason will be logged and the transfer will be retried later (see send retry note)
Association aborted	The command is marked as failed. The reason will be logged and the transfer will be retried later (see send retry note)

Applicable communication parameters are listed in section 4.4.2.

4.2.1.3.3 Activity - Span a Query

Description and Sequencing of Activities

EA can be used as a gateway for other Application Entities in the sense that queries on EA return information on instances present in EA *and* in the Application Entities for which EA is used as a gateway. This is accomplished by spanning queries to remote Application Entities and returning all results to the requesting system.

Proposed Presentation Contexts

Table 16 Presentation Context Table for Span a Query

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Study Root Query/ Retrieve Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Explicit VR, Little Endian	1.2.840.10008.1.2.1	SCU	See Note 1. The following

		Implicit VR, Little Endian	1.2.840.10008.1.2		extended negotiation information is added to the Associate-RQ

Note 1. The following extended negotiation information is added to the Associate-RQ

Table 17 Query - Extended negotiation Initiation Policy

Option Name	Value
Relational-queries	1 (relational queries requested)

SOP Specific Conformance Statement

Standard conformance is provided.

When the query-spanning feature is enabled, EA will forward queries unmodified, so it is the querying client that identifies the tags used in this request.

EA expects the support for Retrieve AE Title and Instance Availability on the Application Entity.

If the move-forwarding feature is enabled for a remote DICOM database, the query results for that remote DICOM database will be modified such that the Retrieve AE title (0008, 0054) contains the AE title of the EA archive that is queried.

When the configured maximum number of query results is reached, EA aborts the query by means of a C-FIND CANCEL. EA will also send a C-FIND CANCEL when it receives such a request from the original requesting system.

Table 18. DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Matching is complete	0000	Operation is considered complete.
Pending	Matches are continuing	FF00	Result is returned to the requesting system.
	Matches are continuing – Warning that one or more Optional Keys were not supported	FF01	Result is returned to the requesting system.
Warning	Sub-operations Complete – One or more Failures	B000	Operation is considered complete.
Failure	All failures.	*	Operation is considered complete. Error code is logged and returned to the requesting system.

Table 19. DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is aborted using A-ABORT and the command is marked as failed. The reason will be logged and a failure code will be sent to the requesting system.
Association aborted	The command is marked as failed. The reason will be logged and a failure code will be sent to the requesting system.

Applicable communication parameters are listed in section 4.4.2.

4.2.1.3.4 Activity - Forward a Move

Description and Sequencing of Activities

The term move forwarding means retrieving from a remote system on request of a DICOM peer.

EA is used as a gateway for other Application Entities in the sense that instances that are present in the other Application Entities can be retrieved as if they were stored locally in EA.

Proposed Presentation Contexts

Table 20 Presentation Context Table for Forward a Move

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name**	**UID**		
Study Root Query/ Retrieve Model - MOVE	1.2.840.10008.5.1.4.1.2.2.2	Explicit VR, Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR, Little Endian	1.2.840.10008.1.2		

SOP Specific Conformance Statement

Standard conformance is provided.

EA will cancel a move operation when it receives a CANCEL requests from the requesting system by sending a C-MOVE CANCEL.

Table 21. DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Sub-operations Complete – No Failures	0000	Operation is considered complete.
Pending	Sub-operations are continuing	FF00	Result is returned to the requesting system.
Warning	Sub-operations Complete – One or more Failures	B000	Operation is considered complete.
Failure	All failures.	*	Operation is considered complete. Error code is logged and returned to the requesting system.

Table 22. DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is aborted using A-ABORT and the command is marked as failed. The reason will be logged and a failure code will be sent to the requesting system.
Association aborted	The command is marked as failed. The reason will be logged and a failure code will be sent to the requesting system.

Applicable communication parameters are listed in section 4.4.2.

4.2.1.3.5 Activity - Retrieve a Modality Worklist

Description and Sequencing of Activities

The prefetch/routing mechanism queries an external system, e.g. a RIS, to determine which priors must be prefetched and routed.

Proposed Presentation Contexts

Table 23 Presentation Context Table for Retrieve a Modality Worklist

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name**	**UID**		
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	Explicit VR, Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR, Little Endian	1.2.840.10008.1.2		

SOP Specific Conformance Statement

EA provides standard conformance.

The query is configurable and can be extended. Any of the returned attributes can be used to trigger prefetching or routing.

In addition to the required attributes the following returned attributes for the Modality Worklist Management are used by default:

Table 24 Additional Default Attributes for Modality Worklist Management

Module	Description	Tag	Type
Study Identification	Study ID	(0020,0010)	O
	Study Description	(0008,1030)	O

The configurable query can make use of the following attribute matching:

- Single Value Matching
- Universal Matching
- Wildcard Matching (for text based VR)
- Range Matching (for data\time based VR)

The prefetch/routing mechanism is an automated background process. EA will not cancel pending modality worklist queries by means of a CANCEL request.

Table 25. DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Matching is complete	0000	Operation is considered complete.
Pending	Matches are continuing	FF00	Operation continues
	Matches are continuing – Warning that one or more Optional Keys were not supported	FF01	Operation continues
Warning	Sub-operations Complete – One or more Failures	B000	Operation is considered complete.

Failure	All failures.	*	Operation is considered complete. Error code is logged.

Table 26. DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is aborted using A-ABORT and the command is marked as failed. The reason will be logged.
Association aborted	The command is marked as failed. The reason will be logged.

Applicable communication parameters are listed in section 4.4.2.

4.2.1.3.6 Activity - Verify the Committed Storage of Instances

Description and Sequencing of Activities

When EA completes a transmission of instances it can optionally verify whether the receiving system acknowledge a positive storage commitment request on the sent instances.

Proposed Presentation Contexts

Table 27 Presentation Context Table Verify the Committed Storage of Instances

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Explicit VR, Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR, Little Endian	1.2.840.10008.1.2		

SOP Specific Conformance Statement

Standard conformance is provided.

If storage commitment is enabled for a remote system, EA will, after sending the instances to the remote system, issue a storage commitment request (N-ACTION). Table 4 and Table 5 give an overview of all SOP class UIDs for which EA may request storage commitment.

The time period of the validity of the Transaction UID that is generated for the storage commitment request is configurable (see section 4.4.2).

EA does not send the optional Storage Media FileSet ID & UID Attributes or the Referenced Study Component Sequence Attribute in the N-ACTION.

The behavior of EA when encountering status codes in an N-ACTION response is summarized in the Table 28.

Table 28. DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The request for storage commitment is considered successfully sent. EA will wait for a configurable amount of time to receive the N-EVENT-REPORT.
Failure	*	*	Request is considered failed. The send operation will be retried. See also 4.2.1.3.2

The behavior of EA during communication failure is summarized in Table 29.

Table 29. DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is aborted using A-ABORT and the command is marked as failed. The send operation will be retried. See also 4.2.1.3.2
Association aborted	The command is marked as failed. The reason will be logged. The send operation will be retried. See also 4.2.1.3.2

Applicable communication parameters are listed in section 4.4.2.

4.2.1.3.7 Activity – Send Storage Commitment

Description and Sequencing of Activities

EA will send a storage commitment (N-EVENT-REPORT) notification message when EA receives a storage commitment request and has confirmed that all instances can be committed. EA will send the notification on a different association then it received the N-ACTION storage commitment requests.
EA will determine at certain time interval if all requested instances can be committed. If not all instances can be committed EA will wait until it can or the wait timeout period expires. This timeout is configurable, section 4.4.2.

Proposed Presentation Contexts

Table 30 Presentation Context Table for Verify the Committed Storage of Instances

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Explicit VR, Little Endian	1.2.840.10008.1.2.1	SCP	None
		Implicit VR, Little Endian	1.2.840.10008.1.2		

EA will propose the SCP role via the SCP/SCU Role Selection Negotiation within a Presentation Context for the Storage Commitment Push Model SOP Class.

SOP Specific Conformance Statement

Standard conformance is provided.

Note: section 4.2.1.4.5 describes how EA handles the initial N-ACTION request for a storage commitment request.

EA does not send the optional Storage Media FileSet ID & UID Attributes in the N-EVENT-REPORT.

EA will set the Retrieve AE title (0008,0054) in the root level of the N-EVENT-REPORT message to the Archive Application Entity that received the N-ACTION requests. The Failure Reason (0008, 1197) for failed instances will be set to 'No such object instance' (0112H).

The behavior of EA when encountering status codes in a N-EVENT-REPORT response is summarized in the table below:

Table 31. DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	Operation is considered complete.
Failure	All failures.	*	Operation is considered failed. Notification is scheduled for retry.

Table 32. DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is aborted using A-ABORT and the command is marked as failed. The reason will be logged. Notification is scheduled for retry.
Association aborted	The command is marked as failed. The reason will be logged. Notification is scheduled for retry.

Applicable communication parameters are listed in section 4.4.2.

4.2.1.3.8 Activity - Convey a Study Change

Description and Sequencing of Activities

EA sends out a notification (N-EVENT-REPORT) to remote DICOM system, indicating that the study has changed or is complete or partial deleted.

Proposed Presentation Contexts

Table 33 Presentation Context Table for Convey a Study Change

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Detached Study Management	1.2.840.10008.3.1.2.3.1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR, Little Endian	1.2.840.10008.1.2.1		
GE Private Detailed Detached Study Management	1.2.528.1.1001.3.1.2.3.1	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR, Little Endian	1.2.840.10008.1.2.1		

EA will propose the SCP role via the SCP/SCU Role Selection Negotiation within a Presentation Context for the Detached Study Management SOP Class and the GE Private Detailed Detached Study Management SOP Class.

SOP Specific Conformance Statement

EA provides standard conformance.

Note: EA does not support N-GET and N-SET operations for this SOP class.

As the behavior of the delete N-EVENT-REPORT is modified in a not compatible manner EA uses the GE Private Detailed Detached Study Management SOP class to send delete notifications when a series or instances are deleted or for patient level updates.

Table 34. Delete and Update (except on IMAGE level) N-EVENT-REPORT Attributes (including important command elements) for the GE Private Detailed Detached Study Management SOP class.

Attribute Name	Tag	Requirement Type (SCU/SCP)	Note
Affected SOP Class UID	(0000,0002)	1/1	(always 1.2.528.1.1001.3.1.2.3.1)
Affected SOP Instance UID	(0000,1000)	1/1	StudyUid of study to be deleted or updated. For Patient Level Updates the value 1.2.528.1.1001.3.1.2.3.1.1 is used.
Event Type ID	(0000,1002)	1/1	8 (Delete), 9 (Update). Delete is not allowed on Patient Level For Update on IMAGE level, see Table 35
Query/Retrieve Level	(0008,0052)	1/1	PATIENT, STUDY, SERIES, IMAGE
Referenced Series Sequence	(0008,1115)	1C/1C	Required when Query/Retrieve level is SERIES. Can contain multiple data sets.
>Series Instance UID	(0020,000E)	1/1	Single valued (VM=1)
Referenced Image Sequence	(0008,1140)	1C/1C	Required when Query/Retrieve level is IMAGE. Can contain multiple data sets.
>Referenced SOP Instance UID	(0008,1155)	1/C	Single valued (VM=1)
Detailed Detached Study Management Selection Sequence	(3121,1013)	1C/1C	Required when Query/Retrieve level is PATIENT. Shall only contain 1 dataset.
>Patient ID	(0010,0020)	1/1	Single valued (VM=1)
> Issuer of Patient ID	(0010,0021)	3/3	
Data Tags		1C/1C	Must be non-empty for update Must be empty for delete

Table 35. Update on IMAGE level N-EVENT-REPORT Attributes (including important command elements) for the GE Private Detailed Detached Study Management SOP class.

Attribute Name	Tag	Requirement Type (SCU/SCP)	Note
Affected SOP Class UID	(0000,0002)	1/1	(always 1.2.528.1.1001.3.1.2.3.1)
Affected SOP Instance UID	(0000,1000)	1/1	StudyUid of study containing instances to be updated.
Event Type ID	(0000,1002)	1/1	9 (Update)
Query/Retrieve Level	(0008,0052)	1/1	IMAGE
Referenced Image Sequence	(0008,1140)	1/1	Can contain multiple data sets if Series Instance Uid filled. If empty then only one data set may be present in this sequence.
>Referenced SOP Instance UID	(0008,1155)	1/1	Single valued (VM=1)
>Data Tags		1/1	
Series Instance UID	(0020,000E)	2/2	Series Instance UID of series containing the instances to be updated can be empty.

Table 36. Move on IMAGE level N-EVENT-REPORT Attributes (including important command elements) for the GE Private Detailed Detached Study Management SOP class.

Attribute Name	Tag	Requirement Type (SCU/SCP)	Note
Affected SOP Class UID	(0000,0002)	1/1	(always 1.2.528.1.1001.3.1.2.3.1)
Affected SOP Instance UID	(0000,1000)	1/1	StudyUid of study containing instances to be moved.
Event Type ID	(0000,1002)	1/1	101 (InstanceMoved)
Query/Retrieve Level	(0008,0052)	1/1	IMAGE
Referenced Image Sequence	(0008,1140)	1/1	Can contain multiple data sets if Series Instance Uid in sequence item is filled. If it is empty, then only one data set may be present in this sequence.
>Referenced SOP Instance UID	(0008,1155)	1/1	Source SOP Instance UID, Single valued (VM=1)
>Sop Instance UID	(0008,0018)	1/1	Target SOP Instance UID. Single valued (VM=1)
>Series Instance UID	(0020.000E)	2/2	Source Series Instance UID. If filled, then all data sets must have same value. Single valued (VM=1)
Study Instance UID	(0020,000D)	1/1	Target Study Instance UID for instances to be moved.
Series Instance UID	(0020,000E)	1/1	Target Series Instance UID for instances to be moved.

The behavior of EA when encountering status codes in an N-EVENT-REPORT response is summarized in the table below:

Table 37. DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	Operation is considered complete.
Failure	All failures.	*	Operation is considered failed. Notification is scheduled for retry.

The behavior of EA during communication failure is summarized in the table below:

Table 38. DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is aborted using A-ABORT and the command is marked as failed. The reason will be logged. Notification is scheduled for retry.
Association aborted	The command is marked as failed. The reason will be logged. Notification is scheduled for retry.

Applicable communication parameters are listed in section 4.4.2.

4.2.1.3.9 Activity - Convey a Instance Availability Notification

Description and Sequencing of Activities

When a set of instances become available or unavailable EA will initiate an Instance Availability Notification to configured AEs.

Proposed Presentation Contexts

Table 39 Presentation Context Table Verify the Committed Storage of Instances

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Instance Availability Notification	1.2.840.10008.5.1.4.33	Explicit VR, Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR, Little Endian	1.2.840.10008.1.2		

SOP Specific Conformance Statement

EA provides standard conformance.

The following conditions will trigger sending an IAN to configured AEs:

- Receiving new instances. EA uses an algorithm to determine if new received instances belong to the same study and will try to pack the new received instances into 1 IAN. The reported status is ONLINE.
- Delete of instances. The reported status is UNAVAILABLE.
- EA generates IAN with status OFFLINE if study is hidden or instances are rejected
- EA sends IAN with ONLINE status after an update is applied.

Table 40. Purpose of reported values of Instance Availability (0008, 0056)

ONLINE	The instance is available and can be retrieved.
UNAVAILABLE	The instance is not available. It cannot be retrieved.

The attributes send in the N-CREATE response are summarized in Table 41. As EA does not support Performed Procedure Sequence SOP classes (0008,1111) will be sent empty.

Table 41. Used N-CREATE Attributes

Attribute Name	Tag
Study Instance UID	(0020,000D)
Referenced Performed Procedure Step Sequence	(0008,1111)
Referenced Series Sequence	(0008,1115)

>Series Instance UID	(0020,000E)
>Referenced SOP Sequence	(0008,1199)
>>Referenced SOP Class UID	(0008,1150)
>>Reference SOP Instance UID	(0008,1155)
>>Instance Availability	(0008,0056)
>>Retrieve AE Title	(0008,0054)

The behavior of EA when encountering status codes in a N-CREATE response is summarized in the table below:

Table 42. DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	Operation is considered complete.
Failure	All failures.	*	Operation is considered failed. Notification is scheduled for retry.

The behavior of EA during communication failure is summarized in the table below:

Table 43. DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is aborted using A-ABORT and the command is marked as failed. The reason will be logged. Notification is scheduled for retry.
Association aborted	The command is marked as failed. The reason will be logged. Notification is scheduled for retry.

Applicable communication parameters are listed in section 4.4.2.

4.2.1.4 Association Acceptance Policy

4.2.1.4.1 Activity - Receive Connectivity Verification

Description and Sequencing of Activities

A remote Application Entity verifies its ability to communicate with EA by sending a verification request.

Accepted Presentation Contexts

Table 44 Presentation Context Table for receive Connectivity Verification

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Verification	1.2.840.10008.1.1	Explicit VR, Little Endian	1.2.840.10008.1.2.1	SCP	None
		Implicit VR, Little Endian	1.2.840.10008.1.2		

SOP Specific Conformance Statement

Standard conformance is provided.

4.2.1.4.2 Activity - Receive Instances

Description and Sequencing of Activities

A remote system sends instances to Enterprise Archive for archival or temporary storage.

Accepted Presentation Contexts

Table 45 Presentation Context Table for Receive Instances

Abstract Syntax		Transfer Syntax	Role	Extended Negotiation
Name	**UID**			
Default Application SOP Classes	See Table 4 and Table 5	SeeTable 47	SCP	See Note 2

Note 2. The SCP will add the following extended negotiation information to the Associate-AC.

Table 46 Receive Instances- Extended Negotiation acceptance policy

Option Name	Value
Level of support	2 (level 2 SCP)
Level of Digital Signature support	1 (Signature Level 1)
Element Coercion	1 (may coerce Data Elements)

Table 47 Transfer Syntaxes for Receive Instances

Name	UID
Implicit VR Little Endian	1.2.840.10008.1.2
Explicit VR Little Endian	1.2.840.10008.1.2.1
Explicit VR Big Endian	1.2.840.10008.1.2.2
JPEG Baseline, Lossy JPEG 8-Bit Image Compression	1.2.840.10008.1.2.4.50
JPEG Extended, Lossy JPEG 12-Bit Image Compression	1.2.840.10008.1.2.4.51
JPEG Lossless, Non-Hierarchical, First-Order Prediction, Lossless JPEG Image Compression	1.2.840.10008.1.2.4.70
JPEG 2000 Image Compression (Lossless Only)	1.2.840.10008.1.2.4.90
JPEG 2000 Image Compression	1.2.840.10008.1.2.4.91
MPEG2 Main Profile @ Main Level	1.2.840.10008.1.2.4.100
MPEG-4 AVC/H.264 High Profile / Level 4.1	1.2.840.10008.1.2.4.102
MPEG-4 AVC/H.264 BD-compatible High Profile / Level 4.1	1.2.840.10008.1.2.4.103
RLE Lossless	1.2.840.10008.1.2.5

Handling of Empty DICOM Tag (0010,0021) During Ingestion

Only for regular archive, EA can be configured to store a default value for the DICOM tag (0010,0021) - "Issuer of Patient ID", when the incoming store does not have the (0010,0021) tag value or when the tag value is empty/NULL. If there exists a value for (0010,0021) tag, EA will use the same during ingestion.

SOP Specific Conformance Statement

EA conforms to the full (level 2) conformance of the Storage SOP class. All Type 1, Type 2 and Type 3 attributes will be retained. In addition private attributes will be stored and included when the instance is sent out again.

When an instance is received that has a SOP Instance UID (0008,0018) that is already present in EA the transfer itself will complete successfully. The existing instance in Enterprise Archive will be overwritten with the new one.

Depending on the configuration compressed upon reception. Based on user defined rules, an image can be stored uncompressed or stored compressed in any of the supported compressions.
Images that are already lossy compressed will not be recompressed lossless or lossy,
Images that were lossy compressed in the past (which can be derived from the value "01" from tag (0028, 2110)) will not be lossy compressed again.
When images are lossy compressed, the value of tag (0028, 2110) is set to "01". Derivation description, Compression Ratio and Compression Method attributes are updated. Instance UID is kept identical to ensure instances are still locatable.
When a configured compression rule cannot compress the instance due to technical limitations of the compression coded the instance is stored as-is.

"The system is configured by default to reject the storage of instances for a Study Instance UID if other instances with conflicting patient identifiers have already been stored/accepted for the same Study Instance UID ."

Images that are received with the MPEG2 Main Profile @ Main Level transfer syntax will always be stored in that transfer syntax.

For unsuccessful storage requests, EA returns one of the following error status codes as listed in Table 48.

Table 48 Return Statuses for Receive Instances

Service Status	Further Meaning	Error Code	Reason
Success	Success	0000	The instance has been received correctly.
Warning	Coercion of Data Elements	B000	Never sent - no coercion is ever performed
	Data Set does not match SOP Class	B007	Never sent - data set is not checked prior to storage
	Elements Discarded	B006	Never sent – all elements are always stored
Failure	Refused: Out of Resources	A700	The instance cannot be stored.
	Error: Data Set does not match SOP Class	A9xx	Never sent - data set is not checked prior to storage
	Error: Patient Identifier Conflict	C123	The instance has been rejected due to patient identifier conflict.
	Error: Cannot understand	Cxxx	Never sent

EA will accept the first Transfer Syntax from the list it accepts. In case of problems there are configuration options to turn off the acceptance of one or more specific Transfer Syntaxes, in order to make EA select a different Transfer Syntax.

Table 49. DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is aborted using A-ABORT the reason will be logged.

Applicable communication parameters are listed in section 4.4.2.

4.2.1.4.3 Activity - Query

Description and Sequencing of Activities

A remote system wants to query the contents of EA or one of the remote archives that are managed by EA.

Accepted Presentation Contexts

Table 50 Presentation Context Table for Query

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name**	**UID**		
Patient Root Query/Retrieve Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	Explicit VR, Little Endian	1.2.840.10008.1.2.1	SCP	See Note 3
		Implicit VR, Little Endian	1.2.840.10008.1.2		
Study Root Query/Retrieve Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	Explicit VR, Little Endian	1.2.840.10008.1.2.1	SCP	See Note 3
		Implicit VR, Little Endian	1.2.840.10008.1.2		

The AE will prefer to select the Explicit VR Little Endian Transfer Syntax if multiple transfer syntaxes are offered. No verification is performed to ensure that a query contains all required tags.

Note 3. The following extended negotiation information is returned if the SCU sends an extended negotiation sub-item in the ASSOCIATE-RQ and requests the feature.

Table 51 Query-Extended Negotiation Acceptance policy

Option Name	Value
Relational-queries	1 (relational queries supported) Only returned as 1 if Relational Queries are requested, otherwise 0.

SOP Specific Conformance Statement

A query that is handled by EA returns data that is retrieved from the index database in EA. Fieldnames in this database are equivalent to the DICOM tags. Each field in the database can be queried for. Additional fields can be added to this database at installation time. By default, the following fields are present in the database.

Security configuration in Enterprise Archive can restrict the incoming query to a subset of the data in EA.
EA limits the number of query results to a configurable maximum (by default 500) and return successful status.

Table 52 Supported Attributes for Query

Level	Description	Tag	Types of Match
Patient	Patient Name	(0010,0010)	S, *, U
Patient	Patient ID	(0010,0020)	S, *, U
Patient	Issuer of Patient ID	(0010,0021)	S, *, U
Patient	Patient Birth Date	(0010,0030)	S, U
Patient	Patient Sex	(0010,0040)	S, *, U
Patient	Other Patient ID	(0010,1000)	S, *, U
Patient	Other PatientIds Sequence	(0010,1002)	NONE
Study	Study Date	(0008,0020)	S, R, U
Study	Study Time	(0008,0030)	R, U
Study	Accession Number	(0008,0050)	S, *, U
Study	Study ID	(0020,0010)	S, *, U
Study	Study Instance UID	(0020,000D)	S, U, L
Study	Modality in Study	(0008,0061)	S, *, U

Study	Institution Name	(0008,0080)	S, *, U
Study	Referring Physician's Name	(0008,0090)	S, *, U
Study	Station Name	(0008,1010)	S, *, U
Study	Study Description	(0008,1030)	S, *, U
Study	Institution Dep. Name	(0008,1040)	S, *, U
Study	Pref. Phys.	(0008,1050)	S, *, U
Study	Read Phys.	(0008,1060)	S, *, U
Study	Number of Study related Series	(0020,1206)	S, U
Study	Number of Study related Images	(0020,1208)	S, U
Study	Series in Study	(0020,1000)	S, U
Study	Study Status ID	(0032,000A)	S, *, U
Study	Reason for Study	(0032,1030)	S, *, U
Series	Modality	(0008,0060)	S, *, U
Series	Series Number	(0020,0011)	S, U
Series	Series Instance UID	(0020,000E)	S, U, L
Series	Series Description	(0008,103E)	S, *, U
Series	Body Part Examined	(0018,0015)	S, *, U
Series	Protocol Name	(0018,1030)	S, *, U
Series	Frame of reference UID	(0020,0052)	S, U, L
Series	Images in Acquisition	(0020,1002)	S, U
Series	Number of Series Related Images	(0020,1209)	S, U
Series	Series Date	(0008,0021)	S, R, U
Series	Series Time	(0008,0031)	R, U
Instance	Image Number	(0020,0013)	S, U
Instance	SOP Instance UID	(0008,0018)	S, U, L
Instance	Transfer syntax UID	(0002,0010)	S, U, L
Instance	Image Type	(0008,0008)	S, *, U
Instance	SOP class UID	(0008,0016)	S, U, L
Instance	Imager Pixel Spacing	(0018,1164)	S, U
Instance	Cassette Orientation	(0018,1402)	S, *, U
Instance	Cassette Size	(0018,1403)	S, U
Instance	Acquisition Number	(0020,0012)	S, U
Instance	Image Position (Patient)	(0020,0032)	S, *, U
Instance	Image Orientation (Patient)	(0020,0037)	S, *, U
Instance	Slice Location	(0020,1041)	S, *, U
Instance	Photometric Interpretation	(0028,0004)	S, *, U
Instance	Number of Frames	(0028,0008)	S, U
Instance	Rows	(0028,0010)	S, U
Instance	Columns	(0028,0011)	S, U
Instance	Pixel Spacing	(0028,0030)	S, U
Instance	Pixel Aspect Ratio	(0028,0034)	S, U
Instance	Bits Allocated	(0028,0100)	S, U
Instance	Pixel Representation	(0028,0103)	S, U
Instance	Window Center	(0028,1050)	S, U
Instance	Window Width	(0028,1051)	S, U
Instance	Rescale Intercept	(0028,1052)	S, U
Instance	Rescale Slope	(0028,1053)	S, U
Instance	Rescale Type	(0028,1054)	S, U
Instance	Window Explanation	(0028,1055)	S, *, U
Instance	Icon Image Sequence	(0088,0200)	U
Instance	Presentation Label	(0070,0080)	S, *, U
Instance	Presentation Description	(0070,0081)	S, *, U
Instance	Presentation Creation Date	(0070,0082)	S, R, U
Instance	Presentation Creation Time	(0070,0083)	R, U
Instance	Presentation Creator's Name	(0070,0084)	S, *, U

Instance	Content Date	(0008,0023)	S, R, U
Instance	Content Time	(0008,0033)	R, U

Table 52 'types of Matching' should be read as follows: a "S" indicates the identifier attribute can specify Single Value Matching, a "R" will indicate Range Matching, a "*" will denote wildcard matching, an 'U' will indicate universal matching, 'L' will indicate that UID lists are supported for matching and "NONE" indicates that no matching is supported, but that values for this Element can be returned if requested.

Attributes for the Series and Image Level of the Study Root Query/Retrieve Information Model are the same as the Attributes for the Series Level and Image Level of the Patient Root Query/Retrieve Information Model.

The following types of attribute matching are supported:

- Single Value Matching
- Universal Matching
- Wild Card Matching
- Range Matching
- Sequence Matching
- List of UID Matching

Enterprise Archive uses case insensitive matching.

For optimal support of Structured Reporting, the following tags should be added to the instance table (via the Management Console). When added, they can be used for querying.

Table 53 Additional Attributes for Non-Image Objects

Level	Description	Tag
Instance	Completion Flag	(0040, A491)
Instance	Verification Flag	(0040, A493)
Instance	Observer Date Time	(0040, A032)
Instance	Concept Name Code Sequence	(0040, A043)*
Instance	Verifying Observer Sequence	(0040, A073)*

*: When a sequence tag is, at storage the whole sequence value is indexed and an Application Entity can query for all containing tags.

When querying at instance level, a number of private tags can be used. An overview is given in the next table.

Table 54 Query Private for Query

Attribute Name	Tag	VR	VM	Attribute Description
Block descriptor	(3113, 00xx)	LO	1	Applicare/RadStore/Version 1.0
State	(3113, xx12)	IS	1	Instance state: "1"= Writable "2"= Read-only "3"= Frozen "4"= Archived "5"= Out-of-Cache
DateLastAccessed	(3113,xx14)	DT	1	Last accessed date-timestamp of study
ByteSize	(3113,xx16)	FD	1	Instance size in bytes
Origin	(3113,xx1E)	LO	1	Instance origin
Version	(3113,xx21)	SL	1	Number of latest version of stored instance.
InstanceFileLocation	(3113,xx23)	ST	1	Location of instance file
Block descriptor	(3121, 00xx)	LO	1	GEHC-IT/Centricity Enterprise Archive/Version 4.0
StorageLibraryType	(3121, xx27)	LO	1	Storage Library Type
InstanceLocator	(3121, xx28)	LT	1	Instance Locator

InstanceUpdatesPending	(3121, xx29)	US	1	Instance Updates Pending
InstanceAvailableInFileSystem	(3121, xx30)	US	1	Instance Available in File System
QueryModifiers	(3121, xx31)	CS	1-n	Query modifiers used to indicate EA to do additional work during C-FIND which sometime not defined in Standard Accepted Values: 1.RETURNSTATUSANDPARTIALRESULTS If this present in the incoming query, EA will send back warning message in case of PIX look up failures.
PatientAgeInDays	(3121, xx39)	SL	1	Patient age in days is used to query DICOM studies between the given age range. The age input is given in the format "lower bound of age in days\0\Upper bound of age in days"

If query spanning has been configured, EA also returns the results from the spanned queries. EA will return in query spanning scenarios the query result of the first match, other matches are filtered out. If the EA archive contains a match that match will have priority above results from external systems.

If move forwarding is enabled EA modifies the following attributes in the spanned query result:
Retrieve AE Title (0008, 0054) (set to EA's AE title followed with the original AE title)
Instance Availability (0008, 0056) (set to near-line, if external system reports on\near-line)

If the move-forwarding feature is disabled, the results are sent unaltered to the querying client. If the move-forwarding feature is enabled, the results are modified: the Retrieve AE title (0008, 0054) is changed into the AE title of the EA archive that is queried. The original Retrieve AE title is added as a second option.

Query behavior with PIX Lookup for Regular Archive:

When PIX Lookup for C-FIND is configured on the regular archive, If PatientId(0010,0020) and IssuerOfPatientId (0010,0021) is present in the incoming C-FIND/QIDO request, Enterprise Archive will query PIX manager to obtain other Patient IDs and Issuer of Patient IDs. As a result of the DICOM query, Enterprise Archive will provide the combined list of studies for all known combinations of Patient ID and Issuer of Patient ID received from PIX manager for that patient to the calling DICOM client. If IssuerOfPatientId (0010,0021) is not present or empty in the incoming C-FIND/QIDO request, Enterprise Archive can use Default Issuer of PatientId if configured for the DICOM client of an archive to query PIX manager.

Query behavior for PACS Archive:

When Query is requested by the client, Enterprise Archive will query solution PIX manager to obtain other Patient IDs and Issuer of Patient IDs. As a result of the DICOM query, Enterprise Archive will provide the combined list of studies for all known combinations of Patient ID and Issuer of Patient ID received from solution PIX manager for that patient to the calling DICOM client. If Issuer of Patient ID or Patient ID tag is having any wildcard characters in the request, then Pix operation will not be performed. Normal EA query will be executed for the request and send back the response.

- If query request contains either 'PatientId' tag or 'IssuerOfPatientId' tag, then PIX operation will be performed
- If both 'PatientId' tag or 'IssuerOfPatientId' tags are not present, then PIX operation will not be performed
- If 'PatientId' tag is present and the 'IssuerofPatientID' tag is not available in the request, Issuer of Patient ID configured to the DICOM client will be defaulted. There could be cases where either the DICOM Client is not configured or there's no PACS DICOM Group configured for the client. In this case, the Primary Authority Name of PACS archive shall be used as default

- If the request doesn't contain 'PatientId' tag, then we will first do the EA query with requested Issuer of Patient Id tag(if this tag value is empty then we will fall back to default Issuer) along with other tags requested and for each records retrieved from EA query, EA will perform the PIX operation.

Assuming this configuration

Client	Client1
Default Issuer of Patient ID (Configured)	DefaultIssuer

PACS PIXm Server

0010,0021|0010,0020	Alternates
Issuer1| Pid1	Issuer2|Pid2, DefaultIssuer|Pid3

Table 55 explains about the different PIX query scenario's for PACS archive

#	DICOM Query			PIXm Request	PIXm Response	Comments
	0010, 0021	0010, 0020	Request			
1	Not Present	Not Present		Not Performed	N/A	No PIXm lookup performed
2 (5)	Not Present	Empty	(0010,0020) : ""	(Do EA Query First) 1.Issuer1|Pid1 2.Issuer2|Pid2 3.Issuer2|Pid123 4.DefaultIssuer|Pid3	(Cache the results) 1. Issuer1|Pid1 Issuer2|Pid2 DefaultIssuer|Pid3 2. Issuer1|Pid1 Issuer2|Pid2 DefaultIssuer|Pid3 3. Issuer2|Pid123 4. Issuer1|Pid1 Issuer2|Pid2 DefaultIssuer|Pid3	Get all patient id's for the query from EA. Do PIX look up for all patient id's and default domain Response: (0010,0020) contains Patient ID in Default PID domain configured for the client group. 0010,0021 will not be returned. Satellite System: Forward original query to satellite system with empty

						patient id and empty issuer of patient Based on satellite result, do pix lookup locally for each patient id and issuer of patient id returned from satellite system. Process PIXm result on remote responses same as for local responses (0010,0021) tag in remote response will not be returned to caller as it wasn't requested
3 (6)	Not Present	Valued	(0010,0020) : Pid3 (0008,1030) : "Hello"	DefaultIssuer|Pid3	Issuer1|Pid1 Issuer2|Pid2 DefaultIssuer|Pid3	Default PID domain configured for the client is used to do PIX lookup, results are used to select the entries to return 0010,0021 will not be returned 0010,0020 to be same as that in the request. Satellite System: Pass Issuer of patient as 'Default Issuer' and Patient Id in original ea query to satellite system

						Do the Pix Look Up locally Check client configured Issuer for Satellite system.(Example , if 'Issuer1' is configured in satellite system) Send one more CFind request to satellite system with 'Issuer1|Pid1' Process PIXm result on remote responses same as for local responses (0010,0021) tag in remote response will not be returned to caller as it wasn't requested
4 (7)	Empty	Not Present	(0010,0021) : "" (0008,1030) : "Hello"	(Do EA Query First) 1.Issuer1|PId1 2.Issuer2|Pid2 3.Issuer2|Pid123 4.DefaultIssuer|Pid3	(Cache the results) 1. Issuer1|Pid1 Issuer2|Pid2 DefaultIssuer|Pid3 2. Issuer1|Pid1 Issuer2|Pid2 DefaultIssuer|Pid3 3. Issuer2|Pid123 4. Issuer1|Pid1 Issuer2|Pid2 DefaultIssuer|Pid3	Only responses for patients that have an PID in the default domain are returned. (0010,0021) in responses contain Default PID domain configured for the client. Satellite System: Forward original query with empty patient id and empty issuer of patient Based on satellite result, do pix lookup locally for each

						patient id and issuer of patient Id returned from satellite system Process PIXm result on remote responses same as for local responses (0010,0020) tag in remote response will not be returned to caller as it wasn't requested
5 (8)	Empty	Empty	(0010,0020) : "" (0008,1030) : "Hello"	(Do EA Query First) 1.Issuer1|Pid1 2.Issuer2|Pid2 3.Issuer2|Pid123 4.DefaultIssuer|Pid3	(Cache the results) 1. Issuer1|Pid1 Issuer2|Pid2 DefaultIssuer|Pid3 2. Issuer1|Pid1 Issuer2|Pid2 DefaultIssuer|Pid3 3. Issuer2|Pid123 4. Issuer1|Pid1 Issuer2|Pid2 DefaultIssuer|Pid3	(0010,0020) contains Patient ID in Default PID domain configured for the client. (0010,0021) contains Default PID domain configured for the client. Since the lookup are to be cached, PIXm request will be made without _target parameter. The results will be cached and the target will be filtered locally Satellite System: Forward original query with empty patient id and empty issuer of patient Based on satellite result, do pix lookup locally for each

						patient id and issuer id returned from satellite Process PIXm result on remote responses same as for local responses
6 (9)	Empty	Valued	(0010,0021) : “” (0010,0020) : Pid3 (0008,1030) : “Hello”	DefaultIssuer|Pid3	Issuer1|Pid1 Issuer2|Pid2 DefaultIssuer|Pid3	Default PID domain configured for the client is used to do PIX lookup, results are used to select the entries to return. (0010,0021) contains Default PID domain configured for the client Satellite System: Pass Issuer of patient as 'DefaultIssuer' and Patient Id in original ea query to satellite system Do the Pix Look Up locally Check client configured Issuer for Satellite system.(Example , if 'Issuer1' is configured) Send one more CFind request to satellite system with Issuer1|Pid1 Process PIXm result on remote

						responses same as for local responses
7	Valued	Not Present	(0010,0021) : Issuer1 (0008,1030) : “Hello”	(Do EA Query First) 1.Issuer1|PId1 2.Issuer2|Pid2 3.Issuer2|Pid123 4.DefaultIssuer|Pid3	(Cache the results) 1. Issuer1|Pid1 Issuer2|Pid2 DefaultIssuer|Pid3 2. Issuer1|Pid1 Issuer2|Pid2 DefaultIssuer|Pid3 3. Issuer2|Pid123 4. Issuer1|Pid1 Issuer2|Pid2 DefaultIssuer|Pid3	(0010,0021) not used for selecting results. (0010,0021) is the response is set as same as in the request Since the lookup are to be cached, PIXm request will be made without _target parameter. The results will be cached and the target will be filtered locally Satellite System: Forward original query with empty patient id and issuer of patient Based on satellite result, do pix lookup for each patient id and issuer id returned from satellite Process PIXm result on remote responses same as for local responses (0010,0020) tag in remote response will not be returned to caller as it wasn’t requested

8	Valued	Empty	(0010,0021) : Issuer1 (0010,0020) : “” (0008,1030) : “Hello”	(Do EA Query First) 1.Issuer1|Pid1 2.Issuer2|Pid2 3.Issuer2|Pid123 4.DefaultIssuer|Pid3	(Cache the results) 1. Issuer1|Pid1 Issuer2|Pid2 DefaultIssuer|Pid3 2. Issuer1|Pid1 Issuer2|Pid2 DefaultIssuer|Pid3 3. Issuer2|Pid123 4. Issuer1|Pid1 Issuer2|Pid2 DefaultIssuer|Pid3	(0010,0021) not used for selecting results (0010,0020) contains Patient ID in requested PID domain. Since the lookup are to be cached, PIXm request will be made without _target parameter. The results will be cached and the target will be filtered locally Satellite System: Forward original query with empty patient id and issuer of patient Based on satellite result, do pix lookup locally for each patient id and issuer id returned from satellite system Process PIXm result on remote responses same as for local responses
9	Valued	Valued	(0010,0021) : Issuer1 (0010,0020) : Pid1 (0008,1030) : “Hello”	Issuer1|Pid1	Issuer1|Pid1 Issuer2|Pid2 DefaultIssuer|Pid3	PIX lookup is done with provided values. Results are used to select the entries to return. Responses have values from request.

						Satellite System: pass Issuer of patient and Patient Id from original ea query to satellite system Do the Pix Look Up locally Check client configured Issuer for Satellite system.(Exampl e , if 'Issuer2' is configured) Send one more CFind request to satellite system with 'Issuer2|Pid2' Process PIXm result on remote responses same as for local responses
1 0	Value d	Value d	(0010,0021) : Issuer5 (0010,0020) : Pid5 (0008,1030) : “Hello”	Issuer5|Pid5	Null (404 - Not found)	

Table 56 Return Statuses for Query

Service Status	Further Meaning	Error Code	Reason
Success	Success	0000	Matching is complete. No final identifier is supplied.
Pending	Matches are continuing – Current Match is supplied and any Optional Keys were supported in the same manner as Required Keys.	FF00	Indicates that the search for further matches is continuing. This is returned when each successful match is returned and when further matches are forthcoming. This status code is returned if all Optional keys in the query identifier are actually supported.

	Matches are continuing – Warning that one or more Optional Keys were not supported for existence and/or matching for this Identifier.	FF01	Indicates that the search for further matches is continuing. This is returned when each successful match is returned and when further matches are forthcoming. This status code is returned if there are Optional keys in the query identifier that are not supported.
Cancel	Matching terminated due to Cancel Request	FE00	The C-FIND SCU sent a Cancel Request. This has been acknowledged and the search for matches has been halted.
Warning	Warning: PIX lookup failed. This indicates, the results might be partial as PIX lookup failed.	BF01	This status will be returned if PIX lookup failed and Query Modifier (3121, xx31)Private tag with value "RETURNSTATUSANDPARTIALRESULTS" present in the C-FIND Query
Failure	Refused: Out of Resources	A700	The query operation cannot be performed.
	Identifier does not match SOP Class	A900	The C-FIND query identifier contains invalid Elements or values, or is missing mandatory Elements or values for the specified SOP Class.

Table 57. DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is aborted using A-ABORT the reason will be logged.

Applicable communication parameters are listed in section 4.4.2.

4.2.1.4.4 Activity - Retrieve an Instance Move Request

Description and Sequencing of Activities

A remote system wants to retrieve instances stored on EA and issues a retrieve command.

Accepted Presentation Contexts

Table 58 Presentation Context Table for Retrieve an Instance Move Request

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Patient Root Query/Retrieve Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None
Study Root Query/Retrieve Model – MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR, Little Endian	1.2.840.10008.1.2	SCP	None

SOP Specific Conformance Statement

Standard conformance is provided.

In addition to this, EA offers relational retrieve whereby for the Patient Root Query/Retrieve Model all studies of a particular patient can be retrieved by providing a Patient ID. Also, for both the Patient Root Query/Retrieve Model and the Study Root Query/Retrieve Model, all instances of a study/series can be retrieved by providing a Study/Series Instance UID.

EA support lists of UIDs in the C-MOVE Request at the Study, Series, and Image Levels. The list of UIDs must be at the Level of the C-MOVE Request however.

The Priority attribute (0000,0700) of a C-MOVE command is used by EA to prioritize the request.

If the destination AE Title of a C-MOVE is the AE Title of EA itself, the request is interpreted as a prefetch request, and the required instances are added to the prefetch queue.

C-MOVE behavior for PACS Archive:

C-MOVE (into a PACS Archive) shall replace Patient ID & Issuer Of Patient ID's as per DICOM client's (destination) Default PID domain in the response. Two types mentioned below

Study level C-MOVE

- EA needs to get the Patient ID and Issuer of Patient ID from DB if not already there.
- EA does PIX lookup to get the Patient ID for the destination DICOM client's Default PID domain
- Leverage PIX cache (and update with PIX results if doing the lookup)
- Leverage PIX cache (and update with PIX results if doing the lookup)

Patient level C-MOVE

For patient level C-MOVE's, also studies from alternate PID's are moved. Default Domain for requesting DICOM client is used if (0010,0021) not present in request and Primary Authority Name of archive is used if Default Domain not configured.

Cmove Operation for PACS Archive , with PIXM enabled, the operation output will happen based on below input conditions

Table 58 CMOVE Operation based on PIXM

Input		**Output Values To be Stored In Destination**	
PatientID	**IssuerOfPatientID**	**PatientID**	**IssuerOfPatientID**
Empty/NullValue	SomeValue	Null Value	For Regular Archive: 1.If DefaultIssuer Configured for destination archive then IssuerOfPatientId = DefaultIssuer 2.If DefaultIssuer not configured then, IssuerOfPatientId = NULL For PACS Archive: DefaultIssuer configured or not configured IssuerOfPatientId = Default Issuer of destination.
SomeValue	Empty/NullValue	Same as Input	For Regular or PACS archive both, If DefaultIssuer configured or not configured **IssuerOfPatientId** = DefaultIssuer configured for Source Archive
Empty/NullValue	Empty/NullValue	Null Value	For Regular Archive: 1.If DefaultIssuer Configured for destination archive then IssuerOfPatientId = DefaultIssuer 2.If DefaultIssuer not configured then, **IssuerOfPatientId** = NULL

			For PACS Archive: If DefaultIssuer configured or not configured IssuerOfPatientId = Default Issuer of destination archive
SomeValue	SomeValue	**Case 1:** Input Issuer == Default Issuer, Output- PID - same as input, Issuer - Default issuer **Case 2:** Input PatientIDIssuer != Default Issuer and PIXM Operation= False Output- PatientID- same as input, PatientIDIssuer- Same as input **Case 3:** Input Issuer != Default Issuer (PIXM Operation= true) E.g PID_789, SYS_C, default Issuer SYS_A Output based on default issuer- PID - PID_123, Issuer - SYS_A	

Table 59. Return Statuses for Move

Service Status	Further Meaning	Error Code	Reason
Success	Sub-operations complete – No Failures	0000	All the Composite SOP Instances have been successfully sent to the C-MOVE Destination AE.
Pending	Sub-operations are continuing	FF00	A Response with this Status Code is sent every time a Composite SOP Instance has been successfully sent to the C-MOVE Destination AE.
Warning	Sub-operations complete – One or more Failures	B000	Operation complete but not all the Composite SOP Instances have been successfully sent to the C-MOVE Destination AE.
Cancel	Matching terminated due to Cancel Request	FE00	The C-MOVE SCU sent a Cancel Request. This has been acknowledged and the export of Composite SOP Instances to the C-MOVE Destination AE has been halted.
Failure	Refused: Move Destination unknown	A801	The Destination Application Entity named in the C-MOVE Request is unknown to EA. Details are logged.
	Identifier does not match SOP Class	A900	The C-MOVE identifier contains invalid Elements or values, or is missing mandatory Elements or values for the specified SOP Class or retrieval level. Details are logged.

Table 60. DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is aborted using A-ABORT the reason will be logged.

Applicable communication parameters are listed in section 4.4.2.

4.2.1.4.5 Activity - Commit Storage of Instances

Description and Sequencing of Activities

After sending instances to EA, a remote system wants to confirm the proper storage of these instances in EA. To this purpose the remote systems sends a storage commit request to EA.
Note however that depending on the configuration EA might not provide long term archiving and that therefore there is no guarantee that the committed instances will remain on the system for a longer period of time (see also below). Committed instances on EA may also be deleted by explicit user operations, if this option is configured.

Accepted Presentation Contexts

Table 61 Presentation Context Table for Commit Storage of Instances

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name**	**UID**		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Explicit VR, Little Endian	1.2.840.10008.1.2.1	SCP	None
		Implicit VR, Little Endian	1.2.840.10008.1.2		

SOP Specific Conformance Statement

Standard conformance is provided.
Note that, although EA supports the repetitive storage of an instance, this model uses the instance UID to determine the identity of an instance and does not guarantee that the last version has been archived.

EA will open a new association to the SCU for transmitting the N-EVENT-REPORT response to the storage commit inquirer.

By default, EA will commit instances as soon as they are stored on short-term storage. However, EA can be configured to only commit instances when they are stored on long-term media.

EA does not always provide commitment for the storage of instances. This is due to the fact that the system can be configured to auto delete studies based on priority rules or only store instances to a low reliable disk.

Committed instances can be retrieved via the normal Query/Retrieve mechanism.

Upon receiving a storage commitment N-ACTION request EA will first wait for a configurable interval (30 seconds by default) before evaluating if all instances can be committed for the first time..

After this initial wait, EA will verify that the instances are present in the system and, in most cases, send a storage commit responds to the inquirer.

However, EA will not send a storage commit responds if some of the instances are present in the system, but do not have the correct state. This can be the case when EA is configured to only commit storage for instances on long-term storage, and some of the requested instances are not migrated yet. In this case EA will re-evaluated the storage commit request after the periodic migration process has executed.

To prevent an endless wait for storage commit, each storage commit request gets an expiry date. When a storage commit request expires, EA sends a storage commit response to the requesting AE. Instances present in the system with an incorrect state are reported as uncommitted.

Table 62. Storage Commitment N-ACTION Response Status Reasons

Service Status	Further Meaning	Error Code	Reason
Success	Success	0000	The storage commitment requested has been successfully received and scheduled.
Failure	Processing Failure	0110H	An internal error occurred during processing of the N-ACTION. Details are logged. A short description of the error will be returned in Error Comment (0000,0902).

Table 63. DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is aborted using A-ABORT the reason will be logged.

Applicable communication parameters are listed in section 4.4.2.

4.2.1.4.6 Activity – Receive Storage Commitment Response

Description and Sequencing of Activities

EA will accept associations in order to receive the response of outstanding storage commitment requests.

Accepted Presentation Contexts

Table 64 Presentation Context Table for Receive Storage Commitment Response

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Explicit VR, Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR, Little Endian	1.2.840.10008.1.2		

EA will only accept the SCU role (which must be proposed via SCP/SCU Role Selection Negotiation) within a Presentation Context for the Storage Commitment Push Model SOP Class.

SOP Specific Conformance Statement

Standard conformance is provided.

EA is capable of receiving N-EVENT-REPORT notifications.

Upon receipt of a N-EVENT-REPORT EA will process the sent job with the same Transaction UID. EA will log a warning when no matching sent job can be found and will return an error to the SCP.

The behavior of EA when receiving Event Types within the N-EVENT-REPORT is summarized in the Table below.

Table 65. Storage Commitment E-EVENT-REPORT Behavior

Event Type Name	Event Type ID	Behavior
Storage Commitment Request Successful	1	The send job is marked completed. Only the Transaction UID (0008, 1195) attribute of the event is used. Other attributes (like Retrieve AE Title (0008, 0054)) are ignored.
Storage Commitment Request Complete – Failures Exist	2	The send job is marked as failed. The reason will be logged. The send operation will be retried. See also 4.2.1.3.2

The reasons for returning specific status codes in a N-EVENT-REPORT response are summarized in the table below.

Table 66. Storage Commitment E-EVENT-REPORT Response Status Reasons

Service Status	Further Meaning	Error Code	Reason
Success	Success	0000	The storage commitment result has been successfully received.
Failure	Processing Failure	0110H	An internal error occurred during processing of the N-EVENTREPORT.A short description of the error will be returned in Error Comment (0000,0902).

Applicable communication parameters are listed in section 4.4.2.

4.2.1.4.7 Activity - Receive a Study Change

Description and Sequencing of Activities

An Application Entity sends a study change notification to EA. EA updates the attributes for this study. If the study is not stored in EA the information in the notification is ignored.
When EA receives a Delete N-EVENT-REPORT notification from a SCP and is configured to accept these notifications it will delete all SOP instances referenced in the N-EVENT-REPORT. EA only supports study, series and instance deletes requests (The level tag must be set to 'STUDY', 'SERIES', or 'IMAGE'). All delete actions will be done synchronous.
When a referenced instance is not contained in EA the final status code will be set to 'no such SOP Instance' and the processing will continue.
When EA fails to delete a referenced instance or series EA will set the status code to 'processing failure' and stops the processing of the N-EVENT-REPORT.
If EA is not configured to accept N-EVENT-REPORT requests the SCP will be unable to set up an association. An error in the N-EVENT-REPORT request will result in a response with the appropriate standard N-EVENT-REPORT status type code (see PS 3.7-2003, 10.1.1.1.8 for a full list of these codes).
A SCP that sends this notification to EA and want to be able to track in detail which SOP instances/ series are successful deleted should only reference 1 SOP instance or series in the N-EVENT-REPORT notification message.

Accepted Presentation Contexts

Table 67 Presentation Context Table for Receive a Study Status Change

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name**	**UID**		
Detached Study Management	1.2.840.10008.3.1.2.3.1	Explicit VR, Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR, Little Endian	1.2.840.10008.1.2		
GE Private Detailed Detached Study Management	1.2.528.1.1001.3.1.2.3.1	Explicit VR, Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR, Little Endian	1.2.840.10008.1.2		

EA will only accept the SCU role (which must be proposed via SCP/SCU Role Selection Negotiation) within a Presentation Context for the Detached Study Management SOP Class or the GE Private Detailed Detached Study Management SOP Class.

SOP Specific Conformance Statement

Standard conformance is provided.

Study Update is the only event type that is handled by EA. The instances referenced by the event and stored in EA are updated accordingly. All attributes on study level can be updated (expect study UID).

As the behavior of the delete N-EVENT-REPORT is modified in a not compatible manner EA uses a private SOP class to receive these kind of delete notifications.

Table 68. Return Statuses for Detached Study Management \ GE Private Detailed Detached Study Management

Service Status	Further Meaning	Error Code	Reason
Success	Success	0000	The N-EVENT-REPORT has been processed without errors.
Failure	Failure Processing	0110	The operation failed. Details are logged.

Table 69. DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is aborted using A-ABORT the reason will be logged.

Applicable communication parameters are listed in section 4.4.2.

4.2.1.4.8 Activity - Receive an IHE IOCM Rejection Note

Description and Sequencing of Activities

An Application Entity sends an IHE IOCM Rejection Note to EA. EA updates the study either by deleting the instances listed in the Rejection Note or by setting the reject status of these instances. Any instance referred to by the rejection note that is not stored in EA is ignored and processing will continue. When an IHE IOCM Rejection Note is corrupted then EA will log error message and an error response is returned to the sending Application Entity.
When an IHE IOCM Rejection Note is received and the client or the requestor does not have permission to delete or update the study then EA will log a warning message and return an error response

Note: If the Private tag "(0x3121,xx32)-Skip IOCM KOS Processing" is present with value 1 in the incoming IOCM KOS object, EA will not act on the IOCM request, but it will be stored in EA

Below are the IHE IOCM Rejection Note types supported by EA:

Table 70 IOCM KOS Rejection note behavior

Rejection Note Title	Behavior in EA
Data Retention Expiration	Deletion of instance(s) after processing of the Rejection Note.
Image Rejection for Quality Reasons	Rejection status is set on instance(s) after processing of the Rejection Note.
Image Correction for Patient Safety Reasons	Rejection status is set on instance(s) after processing of the Rejection Note.
Object Correction due to Modality Worklist Selection Error	Rejection status is set on instance(s) after processing of the Rejection Note.

4.2.1.5 WADO-URI Specifications

EA supports WADO-URI retrieval for configured archives.

The base address (URL) for WADO-URI retrieval for a configured archive AE is:

http(s)://[hostname]/ea/[Application Entity Title]/wado

The following MIME types are supported:

Table 71. Supported MIME types for Single Frame Image Objects

application/dicom
image/jpeg
image/gif
Image/png

The standard defines the Single Frame Image Object category as instances of SOP classes that consist of a single image frame, instances of multi-frame SOP Classes that contain only one frame or objects instances that consist of a single frame accessed from instances of multi-frame SOP classes using the 'frameNumber' parameter.

Table 72. Supported MIME types for Multi Frame Image Objects

application/dicom
video/mpeg (for instances stored in the MPEG transfer syntax)

The standard defines the Multi Frame Image Object category as all SOP classes that are defined in PS 3.3 as multi-frame image objects.

Table 73. Supported MIME types for Text Objects

application/dicom
text/plain
text/html
text/xml

The standard defines the Text Object category as all SOP classes defined in PS 3.3 that include the SR Document Content Module.

Table 74. Supported MIME types for Other Objects

application/dicom
application/pdf (for Encapsulated PDF Storage instances)

The standard defines the Other Object category as all persistent SOP classed defined in PS 3.3 and not part of one of the other categories.

EA recognizes and handles the optional WADO-URI parameters as listed in Table 75. Optional parameters not listed in this table and present in the request will be ignored.

Table 75. Recognized Optional WADO-URI Parameters.

Parameter	Value(s)	Notes
charset	UTF-8, GB18030	This parameter is only supported when retrieving as mime type application/dicom
transferSyntax	Explicit VR Little Endian (1.2.840.10008.1.2.1), JPEG Lossless (1.2.840.10008.1.2.4.70),	This parameter is only supported when the mime type is

	JPEG 2000 Image Compression, Lossless Only (1.2.840.10008.1.2.4.90)	application/dicom. When it is not present EA will encode the instance in Explicit VR Little Endian (as required by WADO-URI).
rows	[1, 5000]	This parameter is only supported for Single Frame Image objects and when the mime type is not application/dicom. Values larger than 5000 will be processed as the value 5000.
columns	[1, 5000]	This parameter is only supported for Single Frame Image objects and when the mime type is not application/dicom. Values larger than 5000 will be processed as the value 5000.
imageQuality	[1, 100]	This parameter is only supported for Single Frame Image objects and when the mime type is application/jpeg.
frameNumber	[1, max – frame number]	This is not supported when the mime type is application/dicom. It will be ignored when the instance is not a multi-frame image.
anonymize	Yes	EA cannot anonymize instances. It will return an error to indicate this fact when this parameter is present in the request..

Table 76. WADO-URI Service Responses

HTTP Response code	Meaning	Reason
200	Success	The operation could be completed successfully.
400	Bad Request	One of the required HTTP fields or required WADO-URI parameters is missing, a parameter has an illegal value or the anonymize parameter is present.
404	Not Found	Incorrect Application Entity Title. Error text: Endpoint not found.
		The SOP instance could not be found. Error text: Requested instance not found for object (+ details).
406	Not Acceptable	Incorrect Mime Type – image/bmp. Error text: No support for requested mime type image/bmp.
500	Internal Server Error	Incorrect Mime Type – video/mpeg. Error text: DICOM object is not containing MPEG data.
503	Service Unavailable	Incorrect Application Entity Title. Error text: The service is unavailable
		Enterprise Archive 8.0 Service stopped. Error text: The service is unavailable

4.2.1.6 WADO-RS Specifications

Enterprise Archive supports WADO-RS retrieval for configured archives.

The base address (URL) for WADO-RS retrieval for a configured archive AE is:

http(s)://[hostname]/ea/[Application Entity Title]

All Transfer Syntaxes supported by Enterprise Archive for storage (see Table 13 Transfer Syntaxes for Send Instances) are supported for WADO-RS retrieval.

All Media Types listed in PS 3.18 Table 6.5-1 "Media Type Mapping to Transfer Syntax" corresponding to Transfer Syntaxes supported by Enterprise Archive for storage (see Table 13 Transfer Syntaxes for Send Instances) are supported for WADO-RS retrieval. Additionally, "application/octet-stream" is supported to return Little Endian uncompressed bulkdata or pixeldata.

Enterprise Archive uses the following algorithm to determine the transfer syntax/media type for the image/frame to be returned:

1. If the request doesn't contain any Accept headers, then 406 "Not Acceptable" is returned.
2. If the request contains an Accept header with a transfer syntax/media type that matches the transfer syntax of the instance as stored, the instance or frame is returned as stored in the archive.
3. If the instance/frame can be converted to the transfer syntax/media type in one of the Accept headers in the request, then the instance/frame is converted to that transfer syntax/media type. Conversion is not supported to or from a MPEG transfer syntax. Also conversion for individual instances can also be impossible due to limitations in the codecs used for the conversion.
4. If none of the previous conditions is matched, the instance or frame is not added to the response. The status 206 "Partial Content" will be returned if some instances or frames are returned or 406 "Not Acceptable" if none of the instances frame can be returned.

Table 77. WADO-RS Service Responses

HTTP Response code	Meaning	Reason
200	Success	The operation could be completed successfully.
206	Partial Content	Accept type, Transfer Syntax or decompression method supported for some but not all requested content
400	Bad Request	The request was malformed
404	Not Found	Specified resource does not exist
406	Not Acceptable	Accept type, Transfer Syntax or decompression method not supported
410	Gone	The item (instance or tag) referenced in the bulkdata reference was not found.
503	Service Unavailable	Incorrect Application Entity Title. Error text: The service is unavailable
		Enterprise Archive 8.0 Service stopped. Error text: The service is unavailable

- For PACS Archive, if PIXm is enabled, then operation will be performed based on below scenarios

Input		Values available in WADO response	
PatientID	**IssuerOfPatientID**	**PatientID**	**IssuerOfPatientID**
Empty/NullValue	SomeValue	Null Value	Null Value
SomeValue	Empty/NullValue	Same as Input	Default Issuer of Archive
Empty/NullValue	Empty/NullValue	Null Value	Null Value
SomeValue	SomeValue	**Case 1:** Input Issuer == Default Issuer, Output- PID - same as input, Issuer - Default issuer	

		Case 2: Input PatientIDIssuer != Default Issuer and PIXM Operation= False Output- PatientID- same as input, PatientIdIssuer- Same as input **Case 3:** Input Issuer != Default Issuer (PIXM Operation= true) E.g PID_789, SYS_C, default Issuer SYS_A Output based on default issuer- PID - PID_123, Issuer - SYS_A

4.2.1.7 QIDO-RS Specifications

Enterprise Archive supports QIDO-RS search for configured archives.

The base address (URL) for QIDO-RS retrieval for a configured archive AE is:

http(s)://[hostname]/ea/[Application Entity Title]

Enterprise Archive supports these media type for the query results, based on the 'Accept' header

- application/dicom+json (default)
- multipart/related; type="application/dicom+xml"

If there are no results matching the query, Enterprise Archive would return a 204 No Content response code, with empty message body.

When the query contains 'includefield=all', all available attributes present in EA Database are returned for the query performed.

The 'limit' query parameter can be used to limit the amount of response data returned. Enterprise Archive shall return a maximum of 500 results when there's no 'limit' parameter specified or when 'limit' = 0.
Also, if 'limit' > 500, only maximum of 500 results shall be returned. If there are more results available (>500), a warning message is included in the response header as:

Warning: 299 {+service}: There are additional results that can be requested.

The 'offset' parameter can be used to skip the number of results before the first returned result. If the 'offset' query parameter is not present, it's value is 0.

QIDO behavior for Regular Archive with PIX:

If the PIX request for regular archive has Issuer of Patient Id requested is empty, EA will use Default Issuer of Patient ID configured for DICOM client and does the PIX operation.

QIDO behavior for PACS Archive:

QIDO will support Calling Ae Title in header. User can set Client Ae Title in the header of the request. Scenario's 2,3,5,6,8,9,10 mentioned in the table "Table 55 explains about the different PIX query scenario's for PACS archive" are applicable for QIDO.
Calling AE Title header example:
CallingAeTitle:"AE_TESTCLIENT"

Table 78. QIDO-RS Service Responses

HTTP Response code	Meaning	Reason
200	Success	The query completed successfully.
204	No Content	No matching content found.
400	Bad Request	The request was malformed.
403	Unauthorized	The client is not authorized to perform query.
503	Service Unavailable	Incorrect Application Entity Title. Error text: The service is unavailable
		Enterprise Archive 8.0 Service stopped. Error text: The service is unavailable
500	Internal Server Error	Failure of query execution.

4.2.1.8 STOW-RS Specifications

Enterprise Archive implements the STOW-RS services for storing DICOM SOP Instances into archives.

The base address (URL) for STOW-RS operation for a configured archive AE is:

http(s)://[hostname]:[port no]/ea/[Application Entity Title]/studies[/{StudyInstanceUID}]

{StudyInstanceUID} (optional) is the study instance UID for a single study. If not specified, instances can be from multiple studies. If specified, all instances shall be from that study; instances not matching the StudyInstanceUID shall be rejected.
STOW-RS will support Calling Ae Title in header. User can set Client AETitle in the header of the request which will be used for profiling. Calling AE Title header example:
CallingAeTitle:"AE_TEST1"

Only for regular archive, EA can be configured to store a default value for the DICOM tag (0010,0021) - “Issuer of Patient ID”, when the incoming store does not have the (0010,0021) tag value or when the tag value is empty/NULL. If there exists a value for (0010,0021) tag, EA will use the same during ingestion.

Table 79 STOW-RS Store Instances Specification

Category	Restrictions
Media Types Supported	Restricted to application/dicom or application/dicom+xml or application/dicom+json
Transfer Syntaxes Supported	Any Transfer Syntax supported by EA. See Table 13 Transfer Syntaxes for Send Instances for supported transfer syntaxes.
SOP Class Restrictions	All SOP classes supported by EA except Multiframe media types for application/dicom+xml and application/dicom+json
Size restriction	Maximum supported size is 100 Mbyte

Enterprise Archive will derive Image Pixel Description Macro attributes from compressed bit stream in bulk data message part and transformation of media types not directly corresponding to a DICOM Transfer Syntax when one or more of following tags is not present or is empty in the application/dicom+xml or application/dicom+json metadata message part:

(0028,0002) Samples per Pixel
(0028,0004) Photometric Interpretation
(0028,0010) Rows
(0028,0011) Columns
(0028,0100) Bits Allocated
(0028.0101) Bits Stored
(0028,0102) High Bit
(0028,0103) Pixel Representation

Following restrictions to this derivation process are applicable for the media types:

Table 80 STOW-RS Media type restrictions

Media Type	Restrictions
image/gif	Initially transformed to Explicit Little Endian format. Can be stored as compressed according to compression rule.
image/jp2	Upload is rejected if Content Type in message part has a Transfer Syntax parameter and it is not matching the Transfer Syntax derived from the compressed bit stream.
image/jpeg	Upload is rejected if Content Type in message part has a Transfer Syntax parameter and it is not matching the Transfer Syntax derived from the compressed bit stream.
image/jpx	Rejected as JPEG 2000 Part 2 Multi-component Image Compression Transfer Syntax is not supported by Enterprise Archive
image/png	Initially transformed to Explicit Little Endian format. Can be stored as compressed according to compression rule.
video/mp4	• Derivation is not supported for MPEG-4 video stream in MPEG-2 container • Upload is rejected if Content Type in message part has a Transfer Syntax parameter and it is not matching the Transfer Syntax derived from the compressed bit stream.
video/mpeg2	• Derivation is not supported for MPEG-2 video stream in MPEG-4 container • Upload is rejected if Content Type in message part has a Transfer Syntax parameter and it is not matching the Transfer Syntax derived from the compressed bit stream.

4.2.1.8.1 Connection Policies

4.2.1.8.1.1 General

All standard RS connection policies apply. There are no extensions for RS options.

4.2.1.8.1.2 Number of Connections

EA STOW-RS service does not limit the number of simultaneous RS requests.

4.2.1.8.1.3 Asynchronous Nature

EA STOW-RS service does not support RS asynchronous response.

4.2.1.8.1.4 SOP Specific Conformance for SOP Class(Es)

The EA STOW-RS service response message header contains status codes indicating success, warning, or failure as shown in the "HTTP Standard Response Codes" below. No additional status codes are used.

Table 81 HTTP Standard Response Codes

HTTP Response code	Meaning	Reason
200	Success	This indicates that the STOW-RS Service successfully stored all the instances.
202	Accepted	This indicates that the STOW-RS Service stored some of the instances but warnings or failures exist for others.

400	Bad Request	This indicates that the STOW-RS Service was unable to store any instances due to bad syntax.
403	Forbidden	This indicates that the STOW-RS Service understood the request, but is refusing to fulfill it (e.g., an authenticated user with insufficient privileges).
409	Conflict	This indicates that the STOW-RS Service request was formed correctly but the service was unable to store any instances due to a conflict in the request.
503	Busy	This indicates that the STOW-RS Service was unable to store any instances because it was out of resources.

The EA STOW-RS service response message body contains the DICOM status codes for individual SOP Instances indicating success, warning, or failure as defined below. No additional status codes are used.

- Return "Conflict" (HTTP Code 409) with Error Status code (C123) when all instances are rejected.
- Returns "Accepted" (HTTP Code 202) with Error Status code(C123) for rejected instances, when one or more instances are rejected, and one or more instances are accepted.
- Returns "Ok" (HTTP Code 200) if all instances are stored successfully.

4.2.2 Modality Procedure Step Forwarder Application Entity Specification

The details of the Application Entity of the Modality Procedure Step Forwarder are specified under this section.

4.2.2.1 SOP Classes

This Application Entity provides Standard Conformance to the following SOP Classes:

Table 82 Modality Procedure Step Forwarder SOP Classes

SOP Class Name	SOP Class UID	Role
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	SCU \ SCP

4.2.2.2 Association Policies

This section describes the general association establishment and acceptance policies for the Archive AE.

4.2.2.2.1 General

The DICOM standard Application Context Name for DICOM is always proposed:

Table 83 Application Context Details

Application Context Name	1.2.840.10008.3.1.1.1.

The user information Items sent by this product are:
- Maximum PDU length
- Implementation UID
- Implementation Version Name

EA will accept the PDU length proposed by the association initiator to a maximum of 65536 bytes.
For larger values, EA will return 65536 as the acceptable max PDU length

EA rejects association requests from applications of which the AE Title is not registered within EA's administration unless it is configured to accept any AE Title.

4.2.2.2.2 Number of Associations

EA supports multiple associations both as an SCU and SCP.

Table 84. Number of associations as an association initiator

Maximum number of simultaneous associations	2 (non configurable)

Table 85. Number of associations as an association acceptor

Maximum number of simultaneous associations.	1000 (non configurable)

4.2.2.2.3 Asynchronous Nature

The implementation supports asynchronous communication (multiple outstanding transactions over a single Association).

Table 86 Asynchronous Associations

Maximum number of outstanding asynchronous transactions	0 (unlimited)

4.2.2.2.4 Implementation Identifying Information

Table 87 Implementation Details

Implementation Class UID	1.2.528.1.1001.2.800.8.0.<buildnumber>
Implementation Version Name	EA8 <buildnumber>

where <buildnumber> is the Enterprise Archive software build number.

4.2.2.3 Association Initiation Policy

4.2.2.3.1 Activity – Forward Performed Procedure Step

Description and Sequencing of Activities

EA can be configured to forward a Modality Performed Procedure Step to other Application Entities.

Accepted Presentation Contexts

Table 88 Presentation Context Table for Forward Performed Procedure Step

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	**UID**	**Name**	**UID**		
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Explicit VR, Little Endian	1.2.840.10008.1.2.1	SCU	None
		Implicit VR, Little Endian	1.2.840.10008.1.2		

SOP Specific Conformance Statement

EA provides standard conformance. The Performed Procedure Step message is sent as it has been received, so both N-SET or N-CREATE.

Table 89. DICOM Command Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	Operation is considered complete.
Failure	All failures.	*	Operation is considered failed. Error code is logged. EA will retry the operation,

Table 90. DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is aborted using A-ABORT and the command is marked as failed. The reason will be logged. EA will retry the operation.
Association aborted	The command is marked as failed. The reason will be logged. EA will retry the operation.

Applicable communication parameters are listed in section 4.4.2.

4.2.2.4 Association Acceptance Policy

4.2.2.4.1 Activity - Receive a Performed Procedure Step

Description and Sequencing of Activities

EA can receive a Performed Procedure Step message. EA can forward these messages to configured AE's. EA will first store the message internally and return a response to the SCU. It will forward the message as a separate process.

Accepted Presentation Contexts

Table 91 Presentation Context Table for Receive a Performed Procedure Step

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Modality Performed Procedure Step	1.2.840.10008.3.1.2.3.3	Explicit VR, Little Endian	1.2.840.10008.1.2.1	SCP	None
		Implicit VR, Little Endian	1.2.840.10008.1.2		

SOP Specific Conformance Statement

Standard conformance is provided.

Table 92. Return Statuses for Receive a Performed Procedure Step (N-CREATE)

Service Status	Further Meaning	Error Code	Reason
Success	Success	0000	The N-CREATE could be stored successful internal Forwarding is done on a background process.
Failure	Invalid Attribute Value	0106	Invalid attribute value.

	Missing Attribute	0120	Missing required attribute.
	Missing Attribute Value	0121	Missing required value.
	Failure Processing	0110	The operation failed. Details are logged.

Table 93. Return Statuses for Receive a Performed Procedure Step (N-SET)

Service Status	Further Meaning	Error Code	Reason
Success	Success	0000	The N-SET \ N-CREATE could be stored successful internal Forwarding is done on a background process.
Failure	Invalid Attribute Value	0106	Invalid attribute value.
	Failure Processing	0110	The operation failed. Details are logged.

Table 94. DICOM Command Communication Failure Behavior

Exception	Behavior
Timeout	The association is aborted using A-ABORT the reason will be logged.

Applicable communication parameters are listed in section 4.4.2.

4.3 NETWORK INTERFACES

4.3.1 Physical Network Interface

The application is indifferent to the physical medium over the underlying operating system and hardware.

4.3.2 Additional Protocols

EA conforms to the following additional protocols defined in PS3.15

Table 95 System Management Profiles Table

Profile Name	Actor	Protocols Used	Optional Transactions	Security Support
Network Address Management	DHCP Client	DHCP	N/A	
	DNS Client	DNS	N/A	
Time Synchronization	NTP Client	DTP	Find NTP Server	
	DHCP Client	DHCP	N/A	

4.3.2.1 DHCP

DHCP can be used to obtain TCP/IP network configuration information. Support for DHCP can be configured via the operating system. If DHCP is not in use, TCP/IP network configuration information can be manually configured.

4.3.2.2 DNS

DNS can be used for address resolution. If DHCP is not in use or the DHCP server does not return any DNS server addresses, the identity of a DNS server can be configured. If a DNS server is not in use, local mapping between hostname and IP address can be manually configured.

4.3.2.3 NTP

The NTP client implements the optional Find NTP Server transaction. The NTP client will issue an NTP broadcast to identify any local NTP servers. If no local servers can found via NTP broadcast, the NTP servers identified by DHCP will be used as time references. Additionally, one or more NTP servers can be configured via the operating system. If no NTP Servers are identified then the local clock will be used as a time reference and a warning written to the system log files.

4.3.3 IPv4 and IPv6 Support

This product supports IPv4.

4.4 CONFIGURATION

The configuration of the EA DICOM services is stored in the Windows Registry and several XML files. Only accounts (secured by passwords) with the right level of security will be able to change the configuration; support personnel will typically do this.

4.4.1 AE Title/Presentation Address Mapping

4.4.1.1 Local AE Titles

Table 96 EA AE-Title details

Application Entity	Default AE Title	Default TCP/IP Port
Archive	AE_<archiveName>	104 / 2762 (secure)
PACS Archive	AE_<archiveName> AE_<archiveName>_C AE_<archiveName>_V AE_<archiveName>_R	104 / 2762 (secure)
Modality Procedure Step Forwarder	AE_MPPS	104 / 2762 (secure)

<archiveName> is the name given to a virtual archive during creation (the first 13 characters of the name are used). AE titles can be reconfigured at any time. There is only configuration for the TCP/IP Port for all AE titles.

4.4.1.2 Remote AE Title/Presentation Address Mapping

All remote systems that want to communicate with the EA Connection Service have to be configured manually. For these DICOM systems the following information is needed:
The AE title.
The host name or IP address.
The port number (optional).
The secure port number (optional).

4.4.2 Parameters

The following general parameters are configurable for EA.

Table 97 General Configurable Parameters

Name	Default Value	Description
Local IP address	<automatic>	IP address
Local IP netmask	<automatic>	IP netmask
Local port number	104	Listening port number for all services

Local secure port number	2762	Secure listening port number
Secure Transport Profile	Basic	Secure Transport Profile used on secure connections
Secure Transport Server certificate		Common Name (CN) of server certificate to use when establishing secure transport connection
Max. Number of Associations	1000	Maximum number of simultaneous accepted associations.
Maximum number of query results	500	Maximum number of query results return on a C-Find request.
Storage Commit SCP request timeout	24 hours	If the requested instances are not in EA, the storage commitment will time out after this period.
Storage Commit SCU response timeout	6 hours	EA will consider storage commitment as failed if the peer does not respond within this time.
Maximum number of concurrent SCU associations	4	Maximum number of simultaneous initiated associations to one remote AE.
Time-out waiting for acceptance or rejection Response to an Association Open Request.	00:01:00	Timeout used by EA as SCU and SCP
Time-out waiting for an Association Close Request.	00:01:00	Timeout used by EA as SCU and SCP
Request time-out	02:00:00	Timeout used by EA as SCU
Receive time-out	02:00:00	Timeout used by EA as SCP
Association operation inactivity time out	00:20:00	Timeout after which an idle association will be aborted.

The following general parameters are configurable for every locally created archive.

Table 98 Configurable Parameter per Archive

Name	Default Value	Description
Local AE Title	AE_<archive name>, per archive	Each archive has its own AE title. (only the first 13 characters of the archive name are used in the default value.

The following specific parameters are configurable for every remote DICOM AE.

Table 99 Configurable Parameters per Remote AE

Name	Default Value	Description
Hostname or IP Address	None	Hostname or IP address of Application Entity
AE Title	None	Title of Application Entity
Port Number	104	Port number of Application Entity
Supported Services	Flags exist for storage, query, retrieve, verification, storage commitment, MPPS, and detached study status management	The set of services for which this the peer has been authorized.
Query Restrictions		Additional query restrictions for this peer.

5 MEDIA INTERCHANGE

EA does not support Media Interchange.

6 SUPPORT OF CHARACTER SETS

6.1 OVERVIEW

In addition to the default character repertoire EA offers support for single-byte, multi-byte and universal character sets. The implementation level is ISO 2022 Level 4 – Re-designation of Graphic Character Sets within a Code (Code level identifier 14).

Apart from standardized character sets, EA accepts some non-standardized character sets and converts the received files into equivalent DICOM defined character sets (Refer Table 104 Supported Non-Standard Specific Character Sets)

6.2 CHARACTER SETS

EA offers full support for the following character sets (possibly with code extension techniques):

Table 100 Supported Single-byte Character Sets without code extensions

Character Set Description	Defined Term
Default repertoire	None
Latin alphabet No. 1	ISO_IR 100
Latin alphabet No. 2	ISO_IR 101
Latin alphabet No. 3	ISO_IR 109
Latin alphabet No. 4	ISO_IR 110
Cyrillic	ISO_IR 144
Arabic	ISO_IR 127
Greek	ISO_IR 126
Hebrew	ISO_IR 138
Latin alphabet No. 5	ISO_IR 148
Japanese	ISO_IR 13
Thai	ISO_IR 166

Table 101 Supported Single-byte Character Sets with code extensions

Character Set Description	Defined Term
Default repertoire	ISO 2022 IR 6
Latin alphabet No. 1	ISO 2022 IR 100
Latin alphabet No. 2	ISO 2022 IR 101
Latin alphabet No. 3	ISO 2022 IR 109
Latin alphabet No. 4	ISO 2022 IR 110
Cyrillic	ISO 2022 IR 144
Arabic	ISO 2022 IR 127
Greek	ISO 2022 IR 126
Hebrew	ISO 2022 IR 138
Latin alphabet No. 5	ISO 2022 IR 148
Japanese	ISO 2022 IR 13
Thai	ISO 2022 IR 166

Table 102 Supported Multi-byte Character Sets with code extensions

Character Set Description	Defined Term
Japanese	ISO 2022 IR 87
	ISO 2022 IR 159
Korean	ISO 2022 IR 149
Simplified Chinese	ISO 2022 IR 58

In addition EA offers support for the following multi-byte character sets without code extensions:

Table 103 Supported Multi-byte Character Sets without code extension

Character Set Description	Defined Term
Unicode in UTF-8	ISO_IR 192
GB18030 (GBK Chinese)	GB18030
GBK	GBK

Table 104 Supported Non-Standard Specific Character Sets

Incoming Specific Character Set (0008,0005)		Converted Specific Character Set (0008,0005)	
Description	**Value**	**Description**	**Value**
Single byte Korean	ISO_IR 149	Multibyte Korean	\ISO 2022 IR 149
Multi byte Chinese	ISO 2022 IR *\ISO 2022 IR 165	Unicode in UTF-8	ISO_IR 192
Unicode in UTF-8 with Code Extensions	ISO_IR 192/*	Unicode in UTF-8	ISO_IR 192

Note: The incoming character set is irreversibly converted to a DICOM standard Specific Character Set per the above table.

6.3 CHARACTER SET CONFIGURATION

The support for reading DICOM data for any of these character sets is default behavior. Likewise, EA will only write or send DICOM data using these character sets if the original data contained those. EA can be configured to create or modify data using either of the universal character sets described above.

As well as supporting these extended character sets for DICOM messaging, the EA database and user interface can support the expected handling and display of this character set.

7 SECURITY

It is assumed that EA is used within a secured environment. It is assumed that a secured environment includes at a minimum:

- Firewall or router protections to ensure that only approved external hosts have network access to EA.
- Firewall or router protections to ensure that EA only has network access to approved external hosts and services.

Any communication with external hosts and services outside the locally secured environment should use secure network channels. This can be achieved by:

- Applying one of the supported Secure Transport Connection Profile on the communication channels
- Using other mechanisms to secure the communication channel, e.g., such as a Virtual Private Network (VPN).

Other network security procedures such as automated intrusion detection may be appropriate in some environments. Additional security features may be established by the local security policy and are beyond the scope of this conformance statement.

7.1 SECURITY PROFILES

7.1.1 Secure Transport Connection Profiles

EA supports the following Secure Transport Connection Profiles:

- Basic TLS Secure Transport Connection Profile
- AES TLS Secure Transport Connection Profile
- Best current practice TLS Secure Connection Profile
- Best current practice plus restrictions TLS Secure Connection Profile

EA supports the following Connection Authentication Policies from the IHE Audit Trail and Node Authentication Profile (ATNA):

- Bi-directional Node Authentication without encryption
- Bi-directional Node Authentication with encryption

EA also supports using the encryption settings as configured on the Windows Operating System.

Only clients providing a certificate that has been configured in EA can establish a DICOM or IHE Secure Transport Connection to EA.

7.1.2 Digital Signatures

EA only conforms to the Bit Preserving Digital Signatures Security Profile if the following restrictions apply.

- EA has not been configured to change the transfer syntax of the archived instance. This implies that compression, or decompression, has been disabled.
- The DICOM SCU AE accepts the current transfer syntax of the archived instance such that EA does not need to convert the transfer syntax of the instance.
- No user or operator has been authorized to edit demographics
- No HL7 host has been configured. This implies that no HL7 host, e.g., a RIS, can send patient or study updates that could modify the instance.
- No DICOM host has been configured to allow to send Study Detached Status updates
- No re-archiving takes place in the workflow of the PACS.

7.1.3 Audit Trail Message Format Profile

EA supports the Audit Trail Message Format Profile. EA can be configured to use the DICOM Audit Message Schema to format audit trail messages. Section 8.7 lists the events EA can detect and reports. EA can send audit trail messages, but it cannot receive audit trail messages. Table 105 lists all configurable audit trail parameters.

Table 105 Overview of audit trail event report configuration parameters

Name	Default Value	Description
Audit Trail Event Enabled	False	Controls if EA will generate audit trail events or not.

7.1.4 Audit Trail Message Transmission Profile – Syslog - TLS

When configured EA can forward audit trail messages to an audit repository as defined by the Audit Trail Message Transmission Profile – Syslog - TLS. EA does not apply any restrictions to the size of the generated messages that it can sent. Table 106 lists all configurable configuration parameters.

Table 106 Syslog TLS Configuration Parameters

Name	Default Value	Description
Destination	None	Hostname or IP address of the audit trail message receiver.
Port	6514	TCP/IP port number of the audit trail message receiver.
Client Certificate Common Name	None	Common Name (CN) of the certificate EA should use as client.
Server Certificate Common Name	None	Common Name (CN) of the certificate EA should use to validate the server.

7.1.5 Audit Trail Message Transmission Profile – Syslog - UDP

When configured EA can forward audit trail messages to an audit repository as defined by the Audit Trail Message Transmission Profile – Syslog - UDP. EA does not apply any restrictions to the size of the generated messages that it can sent. Table 107 lists all configurable configuration parameters.

Table 107 Syslog UDP Configuration Parameters

Name	Default Value	Description
Destination	None	Hostname or IP address of the audit trail message receiver.
Port	514	TCP/IP port number of the audit trail message receiver.

7.2 ASSOCIATION LEVEL SECURITY

EA can be configured to check the following DICOM values when determining whether to accept Association Open Requests:

- Called AE Title
- Calling AE Title
- Application Context

Each called AE, i.e. archive, can be configured to accept association requests from only a limited list of calling AE titles. The called AEs can have different lists. In addition, the IP address of the requestor can be checked.

7.3 APPLICATION LEVEL SECURITY

None supported.

8 ANNEXES

8.1 IOD CONTENTS

8.1.1 Created SOP Instances

EA creates SOP instances from received or archived SOP instances if lossy compression has been configured.

To enable the traceability of instances within a PACS, EA can be configured NOT to change the UID of an instance at lossy compression. This should only be used in workflow situations such as a GE-PACS that relies on the fact that instance UIDs are unchanged.

Enterprise Archive does not support the use of alternate representations.

This section specifies each IOD created by this application and specifies the content for each IOD created (including private IODs). For each attribute in the IOD the following information is supplied:

- Attribute name
- Tag
- VR – Value representation
- Presence of value - specifies if attribute is always present or only under specific conditions
- Source of value - specifies the source of the value

Abbreviations used in the Module table for the column "Presence of Value" are:

- ALWAYS-The attribute is always present with a value.
- EMPTY-The attribute is always present without any value. (attribute sent zero length)
- VNAP-The attribute is always present and its Value is Not Always Present. (attribute sent zero length if no value is present)
- ANAP-The attribute is present under specified condition – if present then it will always have a value.

Table 108 List of Created SOP Classes

SOP class Name	SOP class UID
Basic Text SR Storage	1.2.840.10008.5.1.4.1.1.88.11

8.1.1.1 Basic Text SR Storage

Table 109 SOP Class modules

IE	Module	Reference
Patient	Patient	Table 110
	Clinical Trial Subject	Not used
Study	General Study	Table 111
	Patient Study	Table 112
	Clinical Trial Study	Not used
Series	SR Document Series	Table 113
	Clinical Trial Series	Not used
Equipment	General Equipment	Table 114
Document	SR Document General	Table 115

	SR Document Content	Table 117
	SOP Common	Table 116

Table 110 Patient Module

Attribute Name	Tag	VR	Presence of Value	Source
Patient's Name	0010,0010	PN	ANAP	Copied from incoming HL7 ORU Message or from the incoming studies for that patient
Patient ID	0010,0020	LO	VNAP	
Issuer of Patient ID	0010,0021	LO	ANAP	
Patient's Birth Date	0010,0030	DA	ANAP	
Patient's Sex	0010,0040	CS	ANAP	
GEIIS Confidential Status	0903,1012	US	ANAP	
Patient's Mother's Birth Name	0010,1060	PN	ANAP	
Other Patient Names	0010,1001	PN	ANAP	
Patient's Address	0010,1040	LO	ANAP	
Patient's Telephone Numbers	0010,2154	SH	ANAP	
Patient's Religious Preference	0010,21F0	LO	ANAP	
Ethnic Group	0010,2160	SH	ANAP	
Region of Residence	0010,2152	LO	ANAP	
Military Rank	0010,1080	LO	ANAP	

Table 111 General Study Module

Attribute Name	Tag	VR	Presence of Value	Source
Study Date	0008,0020	DA	ALWAYS	Generated by EA at the time of IOD creation
Study Time	0008,0030	TM	ALWAYS	
Referring Physician's Name	0008,0090	PN	VNAP	Copied from incoming HL7 ORU Message or from the study, if the study already present in EA otherwise empty
Study ID	0020,0010	SH	VNAP	Copied from the study, if the study already present in EA otherwise empty
Accession Number	0008,0050	SH	ANAP	Copied from ORU Message or from the studies available for that patient
Study Description	0008,1030	LO	ANAP	Copied from the existing study, if the study already present in EA otherwise empty
Study Instance UID	0020,000D	UI	ALWAYS	Copied from HL7 ORU Message or from matching the IOD to a study with the same patient ID and Accession Number or generated.

Table 112 Patient Study Module

Attribute Name	Tag	VR	Presence of Value	Source
Admission ID	0038,0010	DA	ANAP	Copied from HL7 ORU Message if present

Table 113 SR Document Series Module

Attribute Name	Tag	VR	Presence of Value	Source
Series Date	0008,0021	PN	ALWAYS	Copied from HL7 ORU message or generated by EA at the time of IOD creation
Series Time	0008,0031	LO	ALWAYS	

Modality	0008,0060	CS	ALWAYS	Value set to SR
Referenced Performed Procedure Step Sequence	0008,1111	SQ	EMPTY	Copied from the series, if the series already present in EA otherwise empty
>Referenced SOP Class UID	0008,1150	UI	ALWAYS	
>Referenced SOP Instance UID	0008,1155	UI	ALWAYS	
Series Instance UID	0020,000E	UI	ALWAYS	Copied from HL7 ORU Message or generated
Series Number	0020, 0011	IS	ALWAYS	Copied form the series, if exists, otherwise generated by EA

Table 114 General Equipment Module

Attribute Name	Tag	VR	Presence of Value	Source
Manufacturer	0008,0070	PN	ALWAYS	Value set to GE HealthCare

Table 115 SR Document General Module

Attribute Name	Tag	VR	Presence of Value	Source
Instance Number	0020,0013	IS	ALWAYS	Generated by EA
Completion Flag	0040,A491	CS	ALWAYS	Value set to COMPLETE always
Verification Flag	0040,A493	CS	ALWAYS	Value set to VERIFIED if verifying observer sequence present in HL7 ORU otherwise UNVERIFIED
Content Date	0008,0023	DA	ANAP	Copied from incoming HL7 ORU Message if present
Content Time	0008,0033	TM	ANAP	
Verifying Observer Sequence	0040,A073	SQ	ANAP	Present if Verification Flag (0040,A493) is VERIFIED.
> Verifying Observer Name	0040,A075	PN	ALWAYS	Copied from incoming HL7 ORU Message
>Verifying Observer Identification Code Sequence	0040,A088	SQ	EMPTY	
>Verifying Organization	0040,A027	LS	ALWAYS	Copied from incoming HL7 ORU Message or generated by EA
>Verification DateTime	0040,A030	DT	ALWAYS	

Table 116 SOP Common Module

Attribute Name	Tag	VR	Presence of Value	Source
SOP Class UID	0008,0016	UI	ALWAYS	Value set to 1.2.840.10008.5.1.4.1.1.88.11
SOP Instance UID	0008,0018	UI	ALWAYS	Copied from HL7 ORU Message or Generated by EA
Specific Character Set	0008,0005	CS	ANAP	Present if extended characters are used

Table 117 SR Document Content Module

Attribute Name	Tag	VR	Presence of Value	Source
Value Type	0040,A040	CS	ALWAYS	Value set to CONTAINER always

Concept Name Code Sequence	0040,A043	SQ	ALWAYS	
>Code Value	0008,0100	SH	ALWAYS	18748-4
> Coding Scheme Designator	0008,0102	SH	ALWAYS	LN
> Code Meaning	0008,0104	LO	ALWAYS	Diagnostic Imaging Report
Continuity of Content	0040,A050	CS	ALWAYS	Value is SEPARATE
Content Template Sequence	0040,A504	SQ	ALWAYS	
>Mapping Resource	0008,0105	CS	ALWAYS	DCMR
>Template Identifier	0040,DB00	CS	ALWAYS	2000
Content Sequence	0040,A730	SQ	ALWAYS	See Table 118 Basic Diagnostic Imaging Report template (TID 2000)
Performed Procedure Code Sequence Attribute	0040,A372	SQ	EMPTY	

Table 118 Basic Diagnostic Imaging Report template (TID 2000)

	NL	Rel with Parent	VT	Concept Name	VM
1			CONTAINER	BCID 7000 "Diagnostic ImagingReport Document Titles"	1
2	>	CONTAINS	DATETIME	Results Rpt/Status Change	1
3	>	CONTAINS	CONTAINER	Findings	1
4	>>	CONTAINS	TEXT	Finding	1-n

8.1.2 Usage of Attributes from received IOD's

The received IOD's must conform to the following requirements to enable EA to archive and process the instance correctly.

- Contain study, series, and instance UIDs

8.1.3 Usage of Attributes from received IHE IOCM KOS Rejection Note

The received IHE IOCM Rejection Note must conform to the following requirements to enable EA to archive and process the instance correctly.

- Contain study, series, instance UIDs and Current Requested Procedure Evidence Sequence

8.1.4 Attribute Mapping

When attributes are used by different SOP Classes, e.g. Modality Worklist, Storage and Modality Performed Procedure Step, this mapping shall be specified. For devices that specify other external protocols, such as HL7, mapping of their fields into the DICOM attributes is not required but highly recommended.

8.1.5 Coerced/Modified Fields

EA has the capability to coerce/modify instance metadata tags when an instance is received from or sent to a DICOM system based on configuration settings. Configuration determines when tags are modified and the type of modifications applied. The original values of the modified tags are stored in the Original Attributes Sequence (0400, 0561) when the instance is coerced/modified at arrival in EA.

8.2 DATA DICTIONARY OF PRIVATE ATRIBUTES

Enterprise Archive defines private attributes with Private Creator ID (3113, 00xx) = “Applicare/RadStore/Version 1.0”.

Table 119 Private EA Attributes in the group (3113, 00xx)

Attribute Name	Tag	VR	VM	Attribute Description
Id1	(3113, xx02)	SL	1-2	Internal Id of Study
Id2	(3113, xx03)	SL	1-2	Internal Id of Series
Id3	(3113, xx04)	SL	1-2	Internal Id of Instance
State	(3113, xx12)	IS	1	Instance state: “1”= Writable “2”= Read-only “3”= Frozen “4”= Archived “5”= Out-of-Cache
DateLastModified	(3113,xx13)	DT	1	Last modified date-timestamp of instance
DateLastAccessed	(3113,xx14)	DT	1	Last accessed date-timestamp of study
ByteSize	(3113,xx16)	FD	1	Instance size in bytes
LibraryId	(3113,xx17)	LO	1	Id of Library
DriverPath	(3113,xx19)	LO	1	EMC Centera Clip ID or S3 Object Id
Source	(3113,xx1A)	LO	1	Source of Image
Destination	(3113,xx1B)	LO	1	Destination of Image
Archive ID	(3113,xx1D)	LO	1	ID of Archive
Origin	(3113,xx1E)	LO	1	Instance origin
Version	(3113,xx21)	SL	1	Number of latest version of stored instance.
InstanceFileLocation	(3113,xx23)	ST	1	Location of instance file
Study State	(3113,xx52)	IS	1	Bitmask containing State of all instances in study: “2”= Writable “4”= Read-only “8”= Frozen “16”= Archived “32”= Out-of-Cache
Series State	(3113,xx53)	IS	1	Bitmask containing State of all instances in series: “2”= Writable “4”= Read-only “8”= Frozen “16”= Archived “32”= Out-of-Cache
Image State Text	(3113,xx55)	CS	1	Image State Text
Series State Text	(3113,xx56)	CS	1	Series State Text
Study State Text	(3113,xx57)	CS	1	Study State Text

Enterprise Archive defines private attributes with Private Creator ID (3121, 00xx) = “GEHC-IT/Centricity Enterprise Archive/Version 4.0”.

Table 120 Private EA Attributes in the group (3121, 00xx)

Attribute Name	Tag	VR	VM	Attribute Description
StudyDateLastModified	(3121, xx01)	DT	1	Last Date Modified of Study
Library Identifiers	(3121, xx02)	LO	1-n	Identifiers of Library
Study Result Count	(3121, xx03)	LO	1	Study Result Count
Study Ilm Status	(3121, xx04)	IS	1	Ilm Status of Study
Study Hidden GE private DICOM tag	(3121, xx05)	SS	1	Study Hidden
Series Hidden	(3121, xx06)	SS	1	Series Hidden
Instance Hidden	(3121, xx07)	SS	1	Instance Hidden
Target Library	(3121, xx08)	LO	1	Target Library
XDS Submission Sequence	(3121, xx09)	SQ	1	XDS Submission Sequence
Document EntryUUID	(3121, xx0A)	LO	1	EntryUUID Of Document
Repository Url	(3121, xx0B)	LO	1	URL of Repository
Library IDs in study	(3121, xx0C)	UL	2	IDs of Library in study
Library IDs in series	(3121, xx0D)	UL	2	IDs of Library in series
Query/Retrieve Count	(3121, xx0E)	SL	1	Query/Retrieve Count
Query Extensions	(3121, xx0F)	ST	1	Extensions of Query
Sorted Modalities in study	(3121, xx10)	LO	1-n	Sorted Modalities in study
Date Last File Change	(3121, xx11)	DT	1	Last Date of File change
Shadow Status	(3121, xx12)	US	1	Status of Shadow
Detailed Detached Study Management Selection Sequence	(3121, xx13)	SQ	1	Additional selection criteria for patient level update.
First Archive Date	(3121, xx14)	DT	1	Date of First Archive
Date Time File Lock Expiration	(3121, xx15)	DT	1	Date Time File Lock Expiration
Offset in Container	(3121, xx16)	SL	1	Offset in Container
Size in Container	(3121, xx17)	SL	1	Size in Container
Series Multi Frame Image Count	(3121, xx18)	IS	1	Number of multi-frame images in a series
Series non-rejected Multi Frame Image Count	(3121, xx19)	IS	1	Number of multi-frame images in a series that are not rejected ((0903, xx10) tag value <> 1)
Series aggregate non-rejected Image Count	(3121, xx20)	IS	1	Number of images in a series that are not rejected ((0903, xx10) <> 1)
Studies aggregate non-rejected Image Count	(3121, xx21)	IS	1	Number of images in a study that are not rejected ((0903, xx10) tag value <> 1)
HL7 Order Message	(3121, xx22)	LT	1	HL7 OMI^O23 message received by the system
HL7 Order Date	(3121, xx23)	DT	1	Order date from Timing/Quantity TQ1-7 field from OMI^O23
HL7 Order Message Type	(3121, xx24)	IS	1	HL7 Message type
HL7 Order Status	(3121, xx25)	IS	1	Order Status from ORC-1 and ORC-5 field from OMI^O23
HL7 Order	(3121, xx26)	SQ		Scheduled Workflow (SWF.b) Order details for satellite systems
StorageLibraryType	(3121, xx27)	LO	1	Storage Library Type
InstanceLocator	(3121, xx28)	LT	1	Instance Locator
InstanceUpdatesPending	(3121, xx29)	US	1	Instance Updates Pending
InstanceAvailableInFileSystem	(3121, xx30)	US	1	Instance Available in File System

Attribute Name	Tag	VR	VM	Attribute Description
QueryModifiers	(3121, xx31)	CS	1-n	Query modifiers used to indicate EA to do additional work during C-FIND which sometime not defined in Standard Accepted Values: 1. RETURNSTATUSANDPARTIALRESULTS If this present in the incoming query, EA will send back warning message in case of PIX look up failures.
SkipIOCMKOSProcessing	(3121, xx32)	IS	1	This used to instruct EA not to process IOCM KOS objects. If this present with value 1 in incoming IOCM KOS object, EA will not process IOCM, but it stores the IOCM KOS instance.
PatientAgeInDays	(3121, xx39)	SL	1	Patient age in days is used to query DICOM studies between the given age range. The age input is given in the format "lower bound of age in days\0\Upper bound of age in days"

Enterprise Archive defines private attributes with Private Creator ID (3123, 00xx) = "GEHC-IT/Isip/Tag Morphing 1.0".

Table 121 Private EA Attributes in the group (3123, 00xx)

Attribute Name	Tag	VR	VM	Attribute Description
Inserted Data Elements	(3123, xx01)	AT	1-n	Reject Status
Nested Data Sets Morphed	(3123, xx02)	IS	1	Significant Status
Item Added by Enterprise Archive	(3123, xx03)	IS	1	Confidential Status

Enterprise Archive defines private attributes with Private Creator ID (0903, 00xx) = "GEIIS PACS".

Table 122 Private EA Attributes in the group (0903, 00xx)

Attribute Name	Tag	VR	VM	Attribute Description

GEIIS Reject Status	(0903, xx10)	US	1	The value of 0 or 1 will be stored to indicate if the image is rejected or not.
GEIIS Significant Status	(0903, xx11)	US	1	The value of 0 or 1 will be stored to indicate if the image is significant or not.
GEIIS Confidential Status	(0903, xx12)	US	1	The value of 0 or 1 will be stored to indicate if the image belongs to a confidential patient.
GEIIS Presentation State Type	(0903, xx20)	CS	1	Presentation State Type
GEIIS Reject Reason Code	(0903, xx40)	ST	1	Reject Reason Code
GEIIS Reject Reason Description	(0903, xx41)	ST	1	Reject Reason Description
GEIIS Rejector Name	(0903, xx42)	ST	1	Rejector Name
GEIIS Reject Date Time	(0903, xx43)	DT	1	Reject Date Time
GEIIS Image Order	(0903, xx30)	US	1	Image Order

8.3 CODED TERMINOLOGY AND TEMPLATES

None.

8.4 GRAYSCALE IMAGE CONSISTENCY

Not applicable.

8.5 STANDARD EXTENDED/SPECIALIZED/PRIVATE SOP CLASSES

Enterprise Archive uses a private SOP Class called detailed detached study management in the activities Convey a Study Status Change and Receive a Study Status Change.

Table 123 Private EA SOP Class

SOP Class	UID	SCU	SCP
GE Private Detailed Detached Study Management	1.2.528.1.1001.3.1.2.3.1	Yes	Yes

8.6 PRIVATE TRANSFER SYNTAXES

None.

8.7 AUDIT TRAIL MESSAGES & DESCRIPTION

The following subsections define message details and specializations used by this product as part of the DICOM Audit Trail Profile.

8.7.1 Application Activity

This audit message describes the event of an application starting or stopping.

Table 124 Application Activity Message – Application Start

Real World Entities	Field Name	Opt.	Value Constraints
Event	EventID	M	EV (110100, DCM, "Application Activity")
	EventActionCode	M	Enumerated Value E = Execute
	EventDateTime	M	<System Current Date>
	EventOutcomeIndicator	M	0
	EventTypeCode	M	DT (110120, DCM, "Application Start")
Active Participant: Application started	UserID	M	<EA Process Id>
	AlternativeUserID	MC	None
	UserName	U	None
	UserIsRequestor	M	False
	RoleIDCode	M	EV (110150, DCM, "Application")
	NetworkAccessPointTypeCode	U	1
	NetworkAccessPointID	U	<Application Hostname>
Audit Source Identification	Audit Source ID	M	<Configurable>
	Audit Enterprise Site ID	U	<Configurable>
	Code	M	<External Source Id>

Table 125 Application Activity Message - Application Stop

Real World Entities	Field Name	Opt.	Value Constraints
Event	EventID	M	EV (110100, DCM, "Application Activity")
	EventActionCode	M	Enumerated Value E = Execute
	EventDateTime	M	<System Current Date>
	EventOutcomeIndicator	M	0
	EventTypeCode	M	DT (110121, DCM, "Application Stop")
Active Participant: Application stopped	UserID	M	4236
	AlternativeUserID	MC	None
	UserName	U	None
	UserIsRequestor	M	False
	RoleIDCode	M	EV (110150, DCM, "Application")
	NetworkAccessPointTypeCode	U	1
	NetworkAccessPointID	U	<Application Hostname>
Audit Source Identification	Audit Source ID	M	<Configurable>
	Audit Enterprise Site ID	U	<Configurable>
	Code	M	<External Source Id>

8.7.2 Instances Stored

This message describes the event of a system storing the DICOM instances. and It includes the following IHE transactions: RAD-8 / RAD-9 / RAD-18 / RAD-19 / RAD-29 / RAD-43 /RAD-66

Table 126 Audit Message for Instances Stored

Real World Entities	Field Name	Opt.	Value Constraints
Event	EventID	M	EV (110104, DCM, "DICOM Instances Transferred")
	EventActionCode	M	Enumerated Value C = Create

	EventDateTime	M	<System Current Date>
	EventOutcomeIndicator	M	0
	EventTypeCode	M	None
Active Participant: (1)	UserID	M	<Source Client Name> e.g. RA600
	AlternativeUserID	MC	None
	UserName	U	None
	UserIsRequestor	M	False
	RoleIDCode	M	EV (110153, DCM, "Source Role ID")
	NetworkAccessPointTypeCode	U	1
	NetworkAccessPointID	U	<Application Hostname>
Active Participant: (2)	UserID	M	<Archive AE_Title> e.g. AE_ARCH1
	AlternativeUserID	MC	None
	UserName	U	None
	UserIsRequestor	M	True
	RoleIDCode	M	EV (110152, DCM, "Destination Role ID")
	NetworkAccessPointTypeCode	U	None
	NetworkAccessPointID	U	None
Participating Object: Studies being transferred (1)	ParticipantObjectTypeCode	M	2
	ParticipantObjectTypeCodeRole	M	3
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	EV(110180,DCM,Study Instance UID)
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	<Study Instance UID>
	ParticipantObjectName	U	None
	ParticipantObjectQuery	U	None
	ParticipantObjectDetail	U	None
	ParticipantObjectDescription	U	None
	SOPClass	MC	< The UIDs of SOP classes referred to in this participant object. >
	Accession	U	<Accession Number>
	NumberOfInstances	U	< The number of SOP Instances referred to by this participant object. >
	Instances	U	None
	Encrypted	U	None
	Anonymized	U	None
Participating Object: Studies being transferred (2)	ParticipantObjectTypeCode	M	1
	ParticipantObjectTypeCodeRole	M	1
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	EV(2, RFC-3381,Patient Number)
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	<Patient ID & Issuer of Patient Id>
	ParticipantObjectName	U	<Patient Name>
	ParticipantObjectQuery	U	None
	ParticipantObjectDetail	U	None
	ParticipantObjectDescription	U	None
	SOPClass	MC	None
	Accession	U	None
	NumberOfInstances	U	None
	Instances	U	None
	Encrypted	U	None
	Anonymized	U	None
Audit Source Identification	Audit Source ID	M	<Configurable>
	Audit Enterprise Site ID	U	<Configurable>
	Code	M	<External Source Id>

8.7.3 Instance Sent

This message describes the event of Instance sent and it includes the following IHE transactions: RAD-16 / RAD-17 / RAD-27 / RAD-31 / RAD-45

Table 127 Audit Message for Instance Sent

Real World Entities	Field Name	Opt.	Value Constraints
Event	EventID	M	EV (110104, DCM, "DICOM Instances Transferred")
	EventActionCode	M	Enumerated Value E = Execute
	EventDateTime	M	<System Current Date>
	EventOutcomeIndicator	M	0
	EventTypeCode	M	None
Active Participant: (1)	UserID	M	<Archive AE_Title> e.g. AE_ARCH1
	AlternativeUserID	MC	None
	UserName	U	None
	UserIsRequestor	M	False
	RoleIDCode	M	EV (110153, DCM, "Source Role ID")
	NetworkAccessPointTypeCode	U	2 if NetworkAccessPointID is IP Address else if NetworkAccessPointID is Hostname/Fully qualified domain name it is 1
	NetworkAccessPointID	U	<Fully qualified Domain Name/Application Hostname/IP Address>
Active Participant: (2)	UserID	M	<Archive AE_Title> e.g. AE_ARCH1
	AlternativeUserID	MC	None
	UserName	U	None
	UserIsRequestor	M	false
	RoleIDCode	M	EV (110152, DCM, "Destination Role ID")
	NetworkAccessPointTypeCode	U	2 if NetworkAccessPointID is IP Address else if NetworkAccessPointID is Hostname/Fully qualified domain name it is 1
	NetworkAccessPointID	U	<Fully qualified Domain Name/Application Hostname/IP Address>
Active Participant: (3) Other Participants that are known, especially users or process that perform the request	UserID	M	<User or Process>
	AlternativeUserID	MC	None
	UserName	U	None
	UserIsRequestor	M	True
	RoleIDCode	M	None
	NetworkAccessPointTypeCode	U	None
	NetworkAccessPointID	U	None
Participating Object: Studies being transferred (1)	ParticipantObjectTypeCode	M	2
	ParticipantObjectTypeCodeRole	M	3
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	EV(110180,DCM,Study Instance UID)
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	< Study Instance UID>
	ParticipantObjectName	U	None
	ParticipantObjectQuery	U	None
	ParticipantObjectDetail	U	None
	ParticipantObjectDescription	U	None
	SOPClass	MC	< The UIDs of SOP classes referred in this participant object. >
	Accession	U	<Accession Number>

	NumberOfInstances	U	< The number of SOP Instances referred to SOP Class by this participant object. >
	Instances	U	None
	Encrypted	U	None
	Anonymized	U	None
Participating Object: Studies being transferred (2)	ParticipantObjectTypeCode	M	1
	ParticipantObjectTypeCodeRole	M	1
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	EV(2, RFC-3381,Patient Number)
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	<Patient ID & Issuer of Patient Id>
	ParticipantObjectName	U	<Patient Name>
	ParticipantObjectQuery	U	None
	ParticipantObjectDetail	U	None
	ParticipantObjectDescription	U	None
	SOPClass	MC	None
	Accession	U	None
	NumberOfInstances	U	None
	Instances	U	None
	Encrypted	U	None
	Anonymized	U	None
Audit Source Identification	Audit Source ID	M	<Configurable>
	Audit Enterprise Site ID	U	<Configurable>
	Code	M	<External Source Id>

8.7.4 Query

This message describes the event of a Query being issued or received. It includes the following IHE transactions: RAD-14 / RAD-15 / RAD-26 / RAD-30 / RAD-44

Table 128 Audit Message for Query

Real World Entities	Field Name	Opt.	Value Constraints
Event	EventID	M	EV (110112, DCM, "Query")
	EventActionCode	M	Enumerated Value: E = Execute
	EventDateTime	M	<System Current Date>
	EventOutcomeIndicator	M	0
	EventTypeCode	U	None
Active Participant: Process Issuing the Query (1)	UserID	M	User/ Process for Ex. AE_ARCH1/EA Console
	AlternativeUserID	U	None
	UserName	U	None
	UserIsRequestor	M	false
	RoleIDCode	M	EV (110153, DCM, "Source Role ID")
	NetworkAccessPointTypeCode	U	2 if NetworkAccessPointID is IP Address else if NetworkAccessPointID is Hostname/Fully qualified domain name it is 1
	NetworkAccessPointID	U	<Fully qualified Domain Name/Application Hostname/IP Address>
Active Participant: The process that will respond to the query (1)	UserID	M	<Archive AE_Title>
	AlternativeUserID	U	None
	UserName	U	None
	UserIsRequestor	M	false

	RoleIDCode	M	EV (110152, DCM, "Destination Role ID")
	NetworkAccessPointTypeCode	U	2 if NetworkAccessPointID is IP Address else if NetworkAccessPointID is Hostname/Fully qualified domain name it is 1
	NetworkAccessPointID	U	<Fully qualified Domain Name/Application Hostname/IP Address>
Active Participant: Other Participants that are known, especially third parties that requested the query (0..N) For.Ex EA Console user	UserID	M	<Domain Name\ Host Name of Server \ User>
	AlternativeUserID	U	None
	UserName	U	None
	UserIsRequestor	M	True
	RoleIDCode	U	None
	NetworkAccessPointTypeCode	U	2 if NetworkAccessPointID is IP Address else if NetworkAccessPointID is Hostname/Fully qualified domain name it is 1
	NetworkAccessPointID	U	<Fully qualified Domain Name/Application Hostname/IP Address>
Participating Object: SOP Queried and the Query (1)	ParticipantObjectTypeCode	M	Enumerated Value: 2 = system
	ParticipantObjectTypeCodeRole	M	Enumerated Value: 3 = report
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	DT (110181, DCM, "SOP Class UID")
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	If the ParticipantObjectIDTypeCode is (110181, DCM, "SOP Class UID"), then this field holds the UID of the SOP Class being queried
	ParticipantObjectName	U	None
	ParticipantObjectQuery	M	If the ParticipantObjectIDTypeCode is (110181, DCM, "SOP Class UID"), then this field holds the Dataset of the DICOM query, xs:base64Binary encoded. Otherwise, it is the query in the format of the protocol used.
	ParticipantObjectDetail	MC	Used if the ParticipantObjectIDTypeCode is (110181, DCM, "SOP Class UID") A ParticipantObjectDetail element with the XML attribute "TransferSyntax" is always present. In this case, the value of the Transfer Syntax attribute is the UID of the transfer syntax of the queryand therefore is a DICOM Transfer Syntax. The element content is an xs:base64Binary encoding.
	ParticipantObjectDescription	U	None
	SOPClass	U	None
	Accession	U	None
	NumberOfInstances	U	None
	Instances	U	None
	Encrypted	U	None
	Anonymized	U	None
Audit Source Identification	Audit Source ID	M	<Configurable>
	Audit Enterprise Site ID	U	<Configurable>
	Code	M	<External Source Id>

8.7.5 WADO Request

This message describes the event of WADO request received by the system. It includes the following IHE transactions: RAD-55.
As part of WADO Request, CallingAETitle can be passed as part of Http Header, which will be used to do PIXM Operation, before returning result.

Table 129 Audit Message for WADO Request

Real World Entities	Field Name	Opt.	Value Constraints
Event	EventID	M	EV (110104, DCM, "DICOM Instances Transferred")
	EventActionCode	M	Enumerated Value R = Read
	EventDateTime	M	<System Current Date>
	EventOutcomeIndicator	M	0
	EventTypeCode	M	None
Active Participant: (1)	UserID	M	URL in below format - https://<EA Server ost Name/ea/<AE_ARCH1>
	AlternativeUserID	MC	None
	UserName	U	None
	UserIsRequestor	M	False
	RoleIDCode	M	EV (110153, DCM, "Source Role ID")
	NetworkAccessPointTypeCode	U	1
	NetworkAccessPointID	U	<Application Hostname>
Active Participant: (2)	UserID	M	<IP Address of EA Server>
	AlternativeUserID	MC	None
	UserName	U	None
	UserIsRequestor	M	True
	RoleIDCode	M	EV (110152, DCM, "Destination Role ID")
	NetworkAccessPointTypeCode	U	None
	NetworkAccessPointID	U	None
Participating Object: Studies being transferred (1)	ParticipantObjectTypeCode	M	2
	ParticipantObjectTypeCodeRole	M	3
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	EV(110180,DCM,Study Instance UID)
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	<Study Instance UID>
	ParticipantObjectName	U	None
	ParticipantObjectQuery	U	None
	ParticipantObjectDetail	U	None
	ParticipantObjectDescription	U	None
	SOPClass	MC	< The UIDs of SOP classes referred in this participant object. >
	Accession	U	<Accession Number>
	NumberOfInstances	U	< The number of SOP Instances referred to SOP class by this participant object. >
	Instances	U	None
	Encrypted	U	None
	Anonymized	U	None
Participating Object: Studies being transferred (2)	ParticipantObjectTypeCode	M	1
	ParticipantObjectTypeCodeRole	M	1
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	EV(2, RFC-3381,Patient Number)
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	<Patient ID & Issuer of Patient Id>

	ParticipantObjectName	U	<Patient Name>
	ParticipantObjectQuery	U	None
	ParticipantObjectDetail	U	None
	ParticipantObjectDescription	U	None
	SOPClass	MC	None
	Accession	U	None
	NumberOfInstances	U	None
	Instances	U	None
	Encrypted	U	None
	Anonymized	U	None
Audit Source Identification	Audit Source ID	M	<Configurable>
	Audit Enterprise Site ID	U	<Configurable>
	Code	M	<External Source Id>

8.7.6 Retrieve Imaging Document Set

This message describes the event of the retrieving the document set. It includes the following IHE transactions: RAD-69.

Table 130 Retrieve Imaging Document Set Audit Message

Real World Entities	Field Name	Opt.	Value Constraints
Event	EventID	M	EV (110104, DCM, "DICOM Instances Transferred")
	EventActionCode	M	Enumerated Value R = Read
	EventDateTime	M	<System Current Date>
	EventOutcomeIndicator	M	0
	EventTypeCode	M	None
Active Participant: (1)	UserID	M	URL in below format - https://<EA Server ost Name/ea/<AE_ARCH1>
	AlternativeUserID	MC	None
	UserName	U	None
	UserIsRequestor	M	False
	RoleIDCode	M	EV (110153, DCM, "Source Role ID")
	NetworkAccessPointTypeCode	U	1
	NetworkAccessPointID	U	<Application Hostname>
Active Participant: (2)	UserID	M	<IP Address of EA Server>
	AlternativeUserID	MC	None
	UserName	U	None
	UserIsRequestor	M	True
	RoleIDCode	M	EV (110152, DCM, "Destination Role ID")
	NetworkAccessPointTypeCode	U	None
	NetworkAccessPointID	U	None
Participating Object: Studies being transferred (1)	ParticipantObjectTypeCode	M	2
	ParticipantObjectTypeCodeRole	M	3
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	EV(110180,DCM,Study Instance UID)
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	<Study Instance UID>
	ParticipantObjectName	U	None
	ParticipantObjectQuery	U	None
	ParticipantObjectDetail	U	None
	ParticipantObjectDescription	U	None

	SOPClass	MC	None
	Accession	U	None
	NumberOfInstances	U	None
	Instances	U	None
	Encrypted	U	None
	Anonymized	U	None
Participating Object: Studies being transferred (2)	ParticipantObjectTypeCode	M	1
	ParticipantObjectTypeCodeRole	M	1
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	EV(2, RFC-3381,Patient Number)
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	<Patient ID>
	ParticipantObjectName	U	None
	ParticipantObjectQuery	U	None
	ParticipantObjectDetail	U	None
	ParticipantObjectDescription	U	None
	SOPClass	MC	None
	Accession	U	None
	NumberOfInstances	U	None
	Instances	U	None
	Encrypted	U	None
	Anonymized	U	None
Audit Source Identification	Audit Source ID	M	<Configurable>
	Audit Enterprise Site ID	U	<Configurable>
	Code	M	<External Source Id>

8.7.7 Registry Stored Query

This message describes the event of ITI-18 i.e. Registry Stored Query.

Table 131 Audit Message for Registry Stored Query

Real World Entities	Field Name	Opt.	Value Constraints
Event	EventID	M	EV (110112, DCM, "Query")
	EventActionCode	M	Enumerated Value: E = Execute
	EventDateTime	M	<System Current Date>
	EventOutcomeIndicator	M	0
	EventTypeCode	U	None
Active Participant (1):	UserID	M	Document Consumer URL
	AlternativeUserID	U	Document Consumer
	UserName	U	None
	UserIsRequestor	M	true
	RoleIDCode	M	EV (110153, DCM, "Source Role ID")
	NetworkAccessPointTypeCode	U	1
	NetworkAccessPointID	U	LDAP IP
Active Participant (2):	UserID	M	LDAP User Id
	AlternativeUserID	U	N/A
	UserName	U	None
	UserIsRequestor	M	true
	RoleIDCode	M	EV (110151, DCM, " Application Launcher")
	NetworkAccessPointTypeCode	U	None

	NetworkAccessPointID	U	None
Active Participant (3):	UserID	M	Registry URL for Registry Stored Query
	AlternativeUserID	U	Registry URL for Registry Stored Query
	UserName	U	None
	UserIsRequestor	M	false
	RoleIDCode	M	EV (110152, DCM, "Destination Role ID")
	NetworkAccessPointTypeCode	U	1
	NetworkAccessPointID	U	LDAP IP
Participating Object:	ParticipantObjectTypeCode	M	1
	ParticipantObjectTypeCodeRole	M	1
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	EV(2, RFC-3881, “Patient Number”)
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	<Patient ID>
	ParticipantObjectName	U	None
	ParticipantObjectDescription	U	None
	SOPClass	U	None
	Accession	U	None
	NumberOfInstances	U	None
	Instances	U	None
	Encrypted	U	None
	Anonymized	U	None
Participating Object:	ParticipantObjectTypeCode	M	2
	ParticipantObjectTypeCodeRole	M	24
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	DT (ITI-18, IHE Transactions, " Registry Stored Query ")
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	urn:uuid
	ParticipantObjectName	U	None
	ParticipantObjectQuery	M	If the ParticipantObjectIDTypeCode is (ITI-18, IHE Transactions, " Registry Stored Query"), then this field holds the Dataset of the Registry stored query, xs:base64Binary encoded. Otherwise, it is the query in the format of the protocol used.
	ParticipantObjectDescription	U	None
	SOPClass	U	None
	Accession	U	None
	NumberOfInstances	U	None
	Instances	U	None
	Encrypted	U	None
	Anonymized	U	None
Audit Source Identification	Audit Source ID	M	<Configurable>
	Audit Enterprise Site ID	U	<Configurable>
	Code	M	<External Source Id>

8.7.8 Register Document Set-b

This message describes the event of a Register Document Set-b issued. It includes the following IHE transaction: ITI-42.

Table 132 Audit Message for Register Document Set-b

Real World Entities	Field Name	Opt.	Value Constraints
Event	EventID	M	EV (110106, DCM, "Export")
	EventActionCode	M	Enumerated Value: R = Read
	EventDateTime	M	<System Current Date>
	EventOutcomeIndicator	M	0
	EventTypeCode	U	EV(ITI-42, IHE Transactions,"Register Document Set-b")
Active Participant (1):	UserID	M	Repository URL
	AlternativeUserID	U	<EA Process Id>
	UserName	U	None
	UserIsRequestor	M	true
	RoleIDCode	M	EV (110153, DCM, "Source Role ID")
	NetworkAccessPointTypeCode	U	1
	NetworkAccessPointID	U	<Application Host Name>
Active Participant (2):	UserID	M	<Registry URL for Register Document Set b>
	AlternativeUserID	U	<Registry URL for Register Document Set b>
	UserName	U	None
	UserIsRequestor	M	false
	RoleIDCode	M	EV (110152, DCM, "Destination Role ID")
	NetworkAccessPointTypeCode	U	1
	NetworkAccessPointID	U	<Registry HostName>
Participating Object:	ParticipantObjectTypeCode	M	1
	ParticipantObjectTypeCodeRole	M	1
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	EV(2, RFC-3881, "Patient Number")
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	<Combination of Patient ID and Hospital ID>
	ParticipantObjectName	U	<Patient Name>
	ParticipantObjectDescription	U	None
	SOPClass	U	None
	Accession	U	None
	NumberOfInstances	U	None
	Instances	U	None
	Encrypted	U	None
	Anonymized	U	None
Participating Object:	ParticipantObjectTypeCode	M	2
	ParticipantObjectTypeCodeRole	M	20
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	EV(Document Entry UID," IHE XDS Metadata"," submission set classificationNode")
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	<Registry UID>
	ParticipantObjectName	U	None
	ParticipantObjectDescription	U	None
	SOPClass	U	None
	Accession	U	None
	NumberOfInstances	U	None
	Instances	U	None
	Encrypted	U	None

	Anonymized	U	None
Audit Source Identification	Audit Source ID	M	<Configurable>
	Audit Enterprise Site ID	U	<Configurable>
	Code	M	<External Source Id>

8.7.9 Provide and Register Document Set-b (repository)

This message describes an event of Provide and Register Document Set-b (repository) and it includes the following transaction: ITI-41.

Table 133 Audit Message for Provide and Register Document Set-b (repository)

Real World Entities	Field Name	Opt.	Value Constraints
Event	EventID	M	EV (110107, DCM, "Import")
	EventActionCode	M	Enumerated Value: C = Create
	EventDateTime	M	<System Current Date>
	EventOutcomeIndicator	M	0
	EventTypeCode	U	EV(ITI-41, IHE Transactions," Provide and Register Document Set-b")
Active Participant (1):	UserID	M	Service URL
	AlternativeUserID	U	None
	UserName	U	None
	UserIsRequestor	M	True
	RoleIDCode	M	EV (110153, DCM, "Source Role ID")
	NetworkAccessPointTypeCode	U	2 If NetworkAccessPointID is IP Address else if NetworkAccessPointID is Hostname/Fully qualified domain name it is 1
	NetworkAccessPointID	U	<Fully qualified Domain Name/Application Hostname/IP Address>
Active Participant (2):	UserID	M	<Repository URL>
	AlternativeUserID	U	<EA Process Id>
	UserName	U	None
	UserIsRequestor	M	False
	RoleIDCode	M	EV (110152, DCM, "Destination Role ID")
	NetworkAccessPointTypeCode	U	1 if NetworkAccessPointID is IP Address else if NetworkAccessPointID is Hostname/Fully qualified domain name it is 2
	NetworkAccessPointID	U	Repository <Fully qualified Domain Name/Application Hostname/IP Address>
Participating Object:	ParticipantObjectTypeCode	M	1
	ParticipantObjectTypeCodeRole	M	1
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	EV(2, RFC-3881, "Patient Number")
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	<Combination of Patient ID and Hospital ID>
	ParticipantObjectName	U	<Patient Name>
	ParticipantObjectDescription	U	None
	SOPClass	U	None
	Accession	U	None
	NumberOfInstances	U	None
	Instances	U	None

	Encrypted	U	None
	Anonymized	U	None
Participating Object:	ParticipantObjectTypeCode	M	2
	ParticipantObjectTypeCodeRole	M	20
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	EV(Document Entry UID," IHE XDS Metadata"," submission set classificationNode")
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	<Registry UID>
	ParticipantObjectName	U	None
	ParticipantObjectDescription	U	None
	SOPClass	U	None
	Accession	U	None
	NumberOfInstances	U	None
	Instances	U	None
	Encrypted	U	None
	Anonymized	U	None
Audit Source Identification	Audit Source ID	M	<Configurable>
	Audit Enterprise Site ID	U	<Configurable>
	Code	M	<External Source Id>

8.7.10 Retrieve Document Set

This message describes an event of Retrieve Document Set and it includes the following transaction ITI-43.

Table 134 Audit Message for Retrieve Document Set

Real World Entities	Field Name	Opt.	Value Constraints
Event	EventID	M	EV (110106, DCM, "Retrieve Document Set")
	EventActionCode	M	Enumerated Value: R =Read
	EventDateTime	M	<System Current Date>
	EventOutcomeIndicator	M	0
	EventTypeCode	U	EV(ITI-43, IHE Transactions, "Retrieve Document Set")
Active Participant (1):	UserID	M	<Repository URL>
	AlternativeUserID	U	<EA Process ID>
	UserName	U	None
	UserIsRequestor	M	False
	RoleIDCode	M	EV (110153, DCM, "Source Role ID ")
	NetworkAccessPointTypeCode	U	1
	NetworkAccessPointID	U	<Application Host Name>
Active Participant (2):	UserID	M	LDAP User Id
	AlternativeUserID	U	N/A
	UserName	U	None
	UserIsRequestor	M	true
	RoleIDCode	M	EV (110151, DCM, " Application Launcher")
	NetworkAccessPointTypeCode	U	None
	NetworkAccessPointID	U	None
Active Participant (3):	UserID	M	Repository URL
	AlternativeUserID	U	<EA Process Id>
	UserName	U	None
	UserIsRequestor	M	True

	RoleIDCode	M	EV (110152, DCM, "Destination Role ID")
	NetworkAccessPointTypeCode	U	1
	NetworkAccessPointID	U	Repository Host IP
Participating Object:	ParticipantObjectTypeCode	M	2
	ParticipantObjectTypeCodeRole	M	3
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	EV(9, RFC-3881, "Report Number")
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	Document Unique ID
	ParticipantObjectDetail	M	Type is "Repository Unique Id" Value is Repository Unique Id base64 encoded
	ParticipantObjectName	U	None
	ParticipantObjectDescription	U	None
	SOPClass	U	None
	Accession	U	None
	NumberOfInstances	U	None
	Instances	U	None
	Encrypted	U	None
	Anonymized	U	None
Audit Source Identification	Audit Source ID	M	<Configurable>
	Audit Enterprise Site ID	U	<Configurable>
	Code	M	<External Source Id>

8.7.11 Provide and Register Document Set-b

This message describes an event of Provide and Register Document Set-b and it includes the following transactions: ITI-41 / RAD-68

Table 135 Audit Message for Provide and Register Document Set-b

Real World Entities	Field Name	Opt.	Value Constraints
Event	EventID	M	EV (110106, DCM, "Export")
	EventActionCode	M	Enumerated Value: R =Read
	EventDateTime	M	<System Current Date>
	EventOutcomeIndicator	M	0
	EventTypeCode	U	EV(ITI-41, IHE Transactions, "Provide and Register Document Set-b")
Active Participant (1):	UserID	M	Document Source URL
	AlternativeUserID	U	Document Source
	UserName	U	None
	UserIsRequestor	M	True
	RoleIDCode	M	EV (110153, DCM, "Source Role ID")
	NetworkAccessPointTypeCode	U	2 If NetworkAccessPointID is IP Address else if NetworkAccessPointID is Hostname/Fully qualified domain name it is 1
	NetworkAccessPointID	U	<Fully qualified Domain Name/Application Hostname/IP Address>
Active Participant (2):	UserID	M	Service URL
	AlternativeUserID	U	<EA Process Id>
	UserName	U	None

	UserIsRequestor	M	True
	RoleIDCode	M	EV (110152, DCM, "Destination Role ID")
	NetworkAccessPointTypeCode	U	2 If NetworkAccessPointID is IP Address else if NetworkAccessPointID is Hostname/Fully qualified domain name it is 1
	NetworkAccessPointID	U	<Fully qualified Domain Name/Application Hostname/IP Address>
Participating Object:	ParticipantObjectTypeCode	M	1
	ParticipantObjectTypeCodeRole	M	1
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	EV(2, RFC-3881, "Patient Number")
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	<Combination of Patient and Registry UID>
	ParticipantObjectName	U	None
	ParticipantObjectDescription	U	None
	SOPClass	U	None
	Accession	U	None
	NumberOfInstances	U	None
	Instances	U	None
	Encrypted	U	None
	Anonymized	U	None
Participating Object:	ParticipantObjectTypeCode	M	2
	ParticipantObjectTypeCodeRole	M	20
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	EV(URN UUID,IHE XDS Metadata, "Submission set classificationNode")
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	Document Unique ID
	ParticipantObjectName	U	None
	ParticipantObjectDescription	U	None
	SOPClass	U	None
	Accession	U	None
	NumberOfInstances	U	None
	Instances	U	None
	Encrypted	U	None
	Anonymized	U	None
Audit Source Identification	Audit Source ID	M	<Configurable>
	Audit Enterprise Site ID	U	<Configurable>
	Code	M	<External Source Id>

8.7.12 Update Document Set (document administrator)

This message describes an event of Update Document Set (document administrator) and it includes the following transaction: ITI-57

Table 136 Audit Message for Provide and Register Document Set-b

Real World Entities	Field Name	Opt.	Value Constraints
Event	EventID	M	EV (110106, DCM, "Export")
	EventActionCode	M	Enumerated Value: U = Update

	EventDateTime	M	<System Current Date>
	EventOutcomeIndicator	M	0
	EventTypeCode	U	EV(ITI-57, IHE Transactions, “Update Document Set”)
Active Participant (1):	UserID	M	LDAP User
	AlternativeUserID	U	5692
	UserName	U	None
	UserIsRequestor	M	True
	RoleIDCode	M	EV (110153, DCM, "Source Role ID")
	NetworkAccessPointTypeCode	U	1
	NetworkAccessPointID	U	<Application Host Name>
Active Participant (2):	UserID	M	Resgitry URL
	AlternativeUserID	U	Resgitry URL
	UserName	U	None
	UserIsRequestor	M	False
	RoleIDCode	M	EV (110152, DCM, "Destination Role ID")
	NetworkAccessPointTypeCode	U	1
	NetworkAccessPointID	U	Domain & HostName
Participating Object:	ParticipantObjectTypeCode	M	1
	ParticipantObjectTypeCodeRole	M	1
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	EV(2, RFC-3881, “Patient Number”)
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	Combination of Patient and Registry UID
	ParticipantObjectName	U	None
	ParticipantObjectDescription	U	None
	SOPClass	U	None
	Accession	U	None
	NumberOfInstances	U	None
	Instances	U	None
	Encrypted	U	None
	Anonymized	U	None
Participating Object:	ParticipantObjectTypeCode	M	2
	ParticipantObjectTypeCodeRole	M	20
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	EV(Document UUID, “IHE XDS Metadata”, Submission Set ClassificationNode”)
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	<Registry UID>
	ParticipantObjectName	U	None
	ParticipantObjectDescription	U	None
	SOPClass	U	None
	Accession	U	None
	NumberOfInstances	U	None
	Instances	U	None
	Encrypted	U	None
	Anonymized	U	None
Audit Source Identification	Audit Source ID	M	<Configurable>
	Audit Enterprise Site ID	U	<Configurable>
	Code	M	<External Source Id>

8.7.13 Secure DICOM Authentication Failed

This message describes an event of failed in authentication for secure DICOM.

Table 137 Audit Message for Secure DICOM Authentication Failed

Real World Entities	Field Name	Opt.	Value Constraints
Event	EventID	M	EV (110113, DCM, " Security Alert")
	EventActionCode	M	Enumerated Value: E = Execute
	EventDateTime	M	<System Current Date>
	EventOutcomeIndicator	M	8
	EventTypeCode	U	EV(110126, DCM, “Node Authentication”)
Active Participant (1):	UserID	M	12736
	AlternativeUserID	U	None
	UserName	U	None
	UserIsRequestor	M	False
	RoleIDCode	M	EV (110150, DCM, " Application")
	NetworkAccessPointTypeCode	U	1
	NetworkAccessPointID	U	<Application Hostname>
Active Participant (2):	UserID	M	<EA Server IP Address>
	AlternativeUserID	U	None
	UserName	U	None
	UserIsRequestor	M	True
	RoleIDCode	M	EV (110151, DCM, "Application Launcher")
	NetworkAccessPointTypeCode	U	None
	NetworkAccessPointID	U	None
Participating Object:	ParticipantObjectTypeCode	M	2
	ParticipantObjectTypeCodeRole	M	13
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	EV(110182, DCM, “Node ID”)
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	<EA Server IP Address>
	ParticipantObjectName	U	None
	ParticipantObjectDescription	U	Alert Description
	SOPClass	U	None
	Accession	U	None
	NumberOfInstances	U	None
	Instances	U	None
	Encrypted	U	None
	Anonymized	U	None
Participating Object:	ParticipantObjectTypeCode	M	2
	ParticipantObjectTypeCodeRole	M	20
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	EV(Document UUID, “IHE XDS Metadata”, Submission Set ClassificationNode”)
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	<Registry UID>
	ParticipantObjectName	U	None
	ParticipantObjectDescription	U	None
	SOPClass	U	None
	Accession	U	None
	NumberOfInstances	U	None
	Instances	U	None
	Encrypted	U	None
	Anonymized	U	None
Audit Source Identification	Audit Source ID	M	<Configurable>
	Audit Enterprise Site ID	U	<Configurable>
	Code	M	<External Source Id>

8.7.14 Secure HTTP Authentication Failed

None

8.7.15 Instance updated

Not Applicable (Audited on proprietary transaction)

8.7.16 Study Deleted

Not Applicable (Audited on proprietary transaction)

8.7.17 Series Deleted

Not Applicable (Audited on proprietary transaction)

8.7.18 Instance Deleted

Not Applicable (Audited on proprietary transaction)

8.7.19 STOW RS

Table 138 Audit message for STOW-RS instance stored

Real World Entities	Field Name	Opt.	Value Constraints
Event	EventID	M	EV (110104, DCM, "DICOM Instances Transferred")
	EventActionCode	M	Enumerated Value C = Create
	EventDateTime	M	<System Current Date>
	EventOutcomeIndicator	M	0
	EventTypeCode	M	None
Active Participant: (1)	UserID	M	IP address of the STOW client
	AlternativeUserID	MC	None
	UserName	U	None
	UserIsRequestor	M	False
	RoleIDCode	M	EV (110153, DCM, "Source Role ID")
	NetworkAccessPointTypeCode	U	1
	NetworkAccessPointID	U	<Application Hostname>
Active Participant: (2)	UserID	M	<Archive AE_Title> e.g. AE_ARCH1
	AlternativeUserID	MC	None
	UserName	U	None
	UserIsRequestor	M	True
	RoleIDCode	M	EV (110152, DCM, "Destination Role ID")
	NetworkAccessPointTypeCode	U	None
	NetworkAccessPointID	U	None
Participating Object: Studies being transferred (1)	ParticipantObjectTypeCode	M	2
	ParticipantObjectTypeCodeRole	M	3
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	EV(110180,DCM,Study Instance UID)
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	<Study Instance UID>
	ParticipantObjectName	U	None

	ParticipantObjectQuery	U	None
	ParticipantObjectDetail	U	None
	ParticipantObjectDescription	U	None
	SOPClass	MC	< The UIDs of SOP classes referred to in this participant object. >
	Accession	U	<Accession Number>
	NumberOfInstances	U	< The number of SOP Instances referred to by this participant object. >
	Instances	U	None
	Encrypted	U	None
	Anonymized	U	None
Participating Object: Studies being transferred (2)	ParticipantObjectTypeCode	M	1
	ParticipantObjectTypeCodeRole	M	1
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	EV(2, RFC-3381,Patient Number)
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	<Patient ID & Issuer of Patient Id>
	ParticipantObjectName	U	<Patient Name>
	ParticipantObjectQuery	U	None
	ParticipantObjectDetail	U	None
	ParticipantObjectDescription	U	None
	SOPClass	MC	None
	Accession	U	None
	NumberOfInstances	U	None
	Instances	U	None
	Encrypted	U	None
	Anonymized	U	None
Audit Source Identification	Audit Source ID	M	<Configurable>
	Audit Enterprise Site ID	U	<Configurable>
	Code	M	<External Source Id>

8.7.20 QIDO-RS

Table 139 Audit message for QIDO-RS

Real World Entities	Field Name	Opt.	Value Constraints
Event	EventID	M	EV (110112, DCM, "Query")
	EventActionCode	M	Enumerated Value: E = Execute
	EventDateTime	M	<System Current Date>
	EventOutcomeIndicator	M	0
	EventTypeCode	U	None
Active Participant: Process Issuing the Query (1)	UserID	M	Requested Url
	AlternativeUserID	U	None
	UserName	U	None
	UserIsRequestor	M	false
	RoleIDCode	M	EV (110153, DCM, "Source Role ID")
	NetworkAccessPointTypeCode	U	1
	NetworkAccessPointID	U	<Application Hostname>
Active Participant: The process that will respond to the query (1)	UserID	M	IP address of the client
	AlternativeUserID	U	None
	UserName	U	None
	UserIsRequestor	M	false
	RoleIDCode	M	EV (110152, DCM, "Destination Role ID")
	NetworkAccessPointTypeCode	U	None
	NetworkAccessPointID	U	None

Participating Object: SOP Queried and the Query (1)	ParticipantObjectTypeCode	M	Enumerated Value: 2 = system
	ParticipantObjectTypeCodeRole	M	Enumerated Value: 3 = report
	ParticipantObjectDataLifeCycle	U	None
	ParticipantObjectIDTypeCode	M	DT (110181, DCM, "SOP Class UID")
	ParticipantObjectSensitivity	U	None
	ParticipantObjectID	M	If the ParticipantObjectIDTypeCode is (110181, DCM, "SOP Class UID"), then this field holds the UID of the SOP Class being queried
	ParticipantObjectName	U	None
	ParticipantObjectQuery	M	If the ParticipantObjectIDTypeCode is (110181, DCM, "SOP Class UID"), then this field holds the Dataset of the DICOM query, xs:base64Binary encoded. Otherwise, it is the query in the format of the protocol used.
	ParticipantObjectDescription	U	None
	SOPClass	U	None
	Accession	U	None
	NumberOfInstances	U	None
	Instances	U	None
	Encrypted	U	None
	Anonymized	U	None
Audit Source Identification	Audit Source ID	M	<Configurable>
	Audit Enterprise Site ID	U	<Configurable>
	Code	M	<External Source Id>